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American Railroad Journal.

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Railroad to the Pacific—Northern Route. Its General Character, Relative Merits, etc.

By EDWIN F. JOHNSON, C. E.

GENERAL VIEW.

The necessity for a railway communication between the principal Atlantic cities of the United States, and the shores of the Pacific, has now become so apparent that public attention is being particularly directed to the best method of accomplishing the object.

The points on the Pacific coast desirable to be reached, as having suitable harbors or conveniences for shipping, and as being favorably situated for concentrating the business of that portion of the Union, are San Diego and San Francisco, in California; the Columbia river in Oregon, and the waters connected with the straits of Juan De Fuca in the new territory of Washington.

The entire Pacific coast within the limits of the United States, presents no other so eligible points as these.

Of the places named, San Francisco and the straits of De Fuca, afford harbors and suitable sites for a maritime city, greatly superior, probably to the others. The relative merits of these two

points for a great commercial mart on the Pacific, will be a subject for future consideration.

The prominent points on the Atlantic seaboard, or those which are most favored in respect to climate, and which command most of the capital of the country, and within which is concentrated the greatest amount of commercial and manufacturing interest, are Boston, New York, Philadelphia and Baltimore.

Of these, New York is decidedly the first, and Philadelphia, only eighty miles distant from it in a direct line, the second. Of the others, one is situated at the North, and the other at the South of the two just named.

The city of New York, from its commanding position in respect to the navigation of the Atlantic and of the great lakes, and the commercial preeminence it has already attained, is clearly the most desirable single point on the Atlantic to be connected with the road in question.

In determining the most eligible route from New York city Westward for the proposed road, it is necessary to consider the character of the country through which it is to pass, its topographical features, soil, climate, and mineral resources, and any other objects of importance in a military or commercial view.

A railroad to the Pacific is not only essential as a means of a direct communication with our own possessions, now rising rapidly into importance on that portion of the continent, but, if rightly located, will constitute the channel through which must pass much of the trade and nearly all the travel between the countries and cities situated on both shores of the Northern Atlantic and the Eastern coast of Asia, and which must afford an amount of business and revenue to the road, exceeding, probably, at first what may be furnished to it from the other sources within our own borders.

The Eastern portions of Asia, including China and Japan, and countries adjacent, which are known to contain a population of many millions in an advanced stage of civilization, in a condition to furnish a very profitable commerce, a commerce which has greatly enriched all that have hitherto participated in it, are situated from three thousand to seven thousand miles only from our Pacific coast.

The place in Eastern Asia which is the most central to this large population and to the great cities of Canton, Nankin, and Peking in China, and Jeddo in Japan, containing each from one to two millions of inhabitants, and which, under the present government, as a free port is accessible, and can be occupied by our vessels without interfering with European powers, is the city of Shanghai in China, situated on the Tung Hai or Eastern sea, near to the mouth of the Yang Tse Kiang, the great river of China.

From New York city to this point, the shortest and most direct line (which is indicated by the arc of a great circle of the earth connecting the two) passes considerably to the north of the forty-ninth degree of north latitude, where the latter meets the Pacific, and hence the straits of Juan de Fuca, the most Northern of the places named on our Pacific coast are situated nearest to the direct line to China within the limits of the United States, and are in this particular the most suitable for the western terminus of the proposed railroad.

In proceeding from New York city to the straits of De Fuca, the position of the great lakes and of the international boundary make it necessary to deflect the line so far to the South as to pass the Southern extremity of Lake Michigan.

The city of Chicago, which is the nearest port of any magnitude to that portion of the lake becomes, therefore, a point in the proposed route. This city is also indicated as a suitable point on the line of the proposed road, from its probable future relation to the internal commerce of the United States. Its position at the South-western limit of the unrivalled navigation of the great lakes and the outlets therefrom to the Atlantic, and the vast and very fertile region commercially dependent upon it at the West, a region which is rapidly filling up with a population unsurpassed for intelligence and enterprise, give assurance of its becoming ultimately the greatest of the very large and flourishing inland cities of our Union, and as such, would justify a departure to a certain extent from the direct course of the proposed road, even if there were no other reasons, such as have already been stated, for such a deviation.

From the city of Chicago lines of railroad by very direct routes are either already built or in a course of construction, leading to all the prominent

cities named and others on the Atlantic seaboard, and hence there is no occasion for any further notice of this portion of the route.

The city of Chicago is distant from the straits of De Fuca, in a direct line 1752 miles, as computed from the latitudes and longitudes of the two places. This line is represented upon the accompanying map, and appears as a curved line, crossing the Missouri river in lat. 46° N. nearly and passing to the north of the Great Falls on that river.

In examining the position of this line it will be seen that a principal obstacle to the attainment of a direct route for a railroad between the points named, is the prolongation to the North and East of the chain of mountains known as the Wind river or Black mountains, which extend from near the South Pass of the Rocky Mountains North-easterly between the Yellow Stone and Missouri rivers to near the latitude of 48° N. and thus cause the great bend in the direction of the latter river in its course to the ocean in the latitude named.

There are other obstacles which are also of a serious character on the direct course.

These are the crossings of the Mississippi, Missouri, and Yellow Stone rivers, where they are navigated by large boats; the range of mountains between the Yellow Stone and Upper Missouri, and the more broken and unfavorable character of the surface generally from the Mississippi river to the Rocky Mountains. These latter, which lie beyond the sources of the Missouri, present, as will be seen hereafter, under a slight deviation from a direct course, no very serious obstacle to the passage of a railroad.

The chain of Wind river and Yellow Stone Mountains, and the other principal obstacles named, are all entirely avoided by carrying the line direct from Chicago to the Great Bend of the Missouri, above mentioned, a departure from the direct course which will not very much increase the distance, and which is fully compensated for, irrespective of its superiority from the circumstances named, by the greater facilities which the country affords for the construction of a railroad in the supply of timber and other materials, and in the opportunity afforded for a connection by a branch railroad with the West end of Lake Superior, and through that with the chain of inland waters, of which that lake forms a part.

From the Great Bend of the Missouri the route proposed is along the Northern side of that river to one of several Passes which are known to exist between its sources and those of the Flathead or Clarks branch of the Columbia river, and thence along the valley of Clarks river and of the Columbia to some point in the vicinity of Fort Okanagan. Here the proposed route leaves the Columbia, and after surmounting the elevated ground which forms the Northern extremity of the Cascade or President's range of Mountains, terminates at the desired point on the Pacific.

To return to the Rocky Mountains. These mountains which separate the waters of the Atlantic from the Pacific do not, at the place proposed for crossing them, possess the formidable character as mountain barriers which pertain to them in other places. They are here very much reduced in height, and are penetrated by Passes or defiles which are evidently very feasible for a railroad.

The Rocky Mountains, instead of being a lofty chain of uniform or nearly uniform elevation extending from the Mexican Andes northward to the Arctic seas, appear upon examination to be arranged in a series of groups, similar, although on a very much larger scale, to the White Mountains of New Hampshire, or the Adirondacks of New York. In elevation their highest peaks within the limits of the United States, are equalled, if not surpassed, by those of another and parallel range lying nearer to the Pacific, and known as the Sierra Nevada and Cascade or President's range of Mountains.

Within the limits of the United States are two very marked depressions in the range of Rocky Mountains. One where the sources of the river Gila Hela approach the waters of the Rio Grande Del Norte, near the Mexican boundary, the other at the place already named between the sources of the Missouri and the Columbia.

Between these is an extended group, or series of mountains, varying in height at different points, and divided by passes into lesser groups, from whose slopes flow the waters of the Columbia, the Colorado, the Rio Grande Del Norte, and the Missouri and Mississippi. The mountains which compose this immense group are situated upon a plain elevated on their southern and eastern side 4000 to 5000 feet above the level of the sea, and on their northern and western side from 2500 to 4000 feet above the same level.

The Mount Washington of the northern section of this group is Fremont's Peak near the South Pass, so called, rising to the height, according to the measurement of the explorer, from whom it takes its name, of 13,570 feet above the ocean level. This and the Three Tetons and the Three Buttes, are the most noted points in this portion of the series. All of them being visible to travellers, by the South Pass, for some distance along their route.

From these elevated points proceed ranges in various directions. The Bear mountains to the south. The Green River mountains forming the main range or Rocky mountains proper, to the south-east. The Wind River and Black mountain chain to the north-east. The Salmon river mountains to the west, the Kootenai mountains to the north-west, and the continuation northerly of the main range to the place of general depression, which is in a line nearly with the valleys of the Upper Missouri and Clarks branch of the Columbia,—a depression which may be considered as extending through three or four degrees of latitude, since within these limits, no less than five passes are known to exist, from such partial explorations only as have thus far been made.

In proceeding north beyond the latitude of forty-nine or fifty degrees, the mountain chain again rises attaining its highest elevation in the Caledonia group in British north America, in latitude fifty-three or fifty-five degrees north, near which are found the lofty peaks of Mt. Hooker and Mt. Brown, the former 15,700 feet, and the latter 16,000 feet above the level of the sea. Gathered about these, or issuing from them are other peaks and ranges forming the series or group from whence flow the waters of the north branch of the Columbia and Frasers river on the west, McKenzies river, on the north and Peace river and the Saskatchewan on the east.

The length of the route, as above described, from the city of Chicago to the Pacific, is estimated as follows, viz:

	Miles.
In Illinois.....	70
In Wisconsin.....	290
In Minnesota.....	620
In Missouri territory.....	420
In Washington do.....	560

Total.....1960

Of this distance nine hundred and ninety miles or about one-half of the whole, are embraced under existing acts of incorporation, granted by the several states and territories for the construction of a railroad on the proposed route as follows:

The portion in Illinois is included in the charter of the "*Illinois and Wisconsin Railroad Company.*" That in Wisconsin in the charter of the "*Rock River Valley Union Railroad Company;*"—and that through Minnesota in the charter of the "*Minnesota Western Railroad Company.*"

The portion of the line in Illinois is located and under contract. Forty miles of it are graded, and twenty-five miles of track have been laid from Chicago west, and a considerable expenditure has been made for equipments. The company will soon commence the business of transportation and the road will be completed to the Wisconsin line by the first day of July next.

Of the portion in Wisconsin, fifty-five miles are located and under contract, and the grading is in progress at various points. This portion passes through Janesville in the Rock River Valley, the principal town in the interior of the state, and extends to Madison the capital of the state. This portion will also be completed by the first day of July next.

It may not be improper to state here that the same company are authorised to construct a branch from Janesville northerly along the Rock River Valley to Lake Superior. This branch is now under contract and building to Fond du Lac, on the Winnebago Lake, eighty-six miles from Janesville. Forty miles of it are graded, and the track laid for half that distance, and transportation has already been commenced upon it.

This branch, when completed, will extend to the copper region of Lake Superior, and connect with the navigation of that lake, and as it passes through a rich and productive portion of the state will eventually do a large business.

From Madison on the main line, northwesterly, surveys have only been carried a short distance beyond the Wisconsin river. For the remaining distance to the Minnesota line, the ground has not yet been instrumentally examined, with a view to the location of a railroad. Measurements for other purposes have however been made, sufficient to show its general character and that two routes at least exist, either of which are very favorable for the purpose.

In Minnesota a survey or reconnaissance has been instituted under the late Act of Congress, making an appropriation for the exploration of several routes for the Pacific road. These surveys for the line in question are under the direction of Governor Stevens of the new territory of Washington, who will continue his reconnaissance to the Pacific upon the route of the proposed road.

The charter in Minnesota is a very liberal one

It secures to the company all lands which may be granted by congress in aid of the road within the limits of the territory, without further action on the part of the government of the territory, and is held by the same parties who are engaged in constructing the lines in Illinois and Wisconsin.

The companies in the two latter states have entered into an agreement authorised by their respective charters to consolidate and bring them under one common management, and a similar arrangement is to be entered into with the company in Minnesota, as soon as an organization is effected in that territory.

The road in Illinois and Wisconsin is being built with the wide gauge of six feet, the only proper gauge for a road of the character of the one in question, and indeed the only suitable gauge for a road which aspires to be of the first class, and expects to maintain hereafter a respectable position in the competition which will necessarily exist between works of this character in the states and territories of the West. Arrangements for harbor accommodations and necessary depot grounds, in the city of Chicago, and at the west end of Lake Superior and elsewhere have been made, and are on a scale commensurate with the importance and magnitude of the work.

The population along and near to the located portion is already large and is very rapidly increasing. Irrespective of the continuation to the Pacific, the importance of the several lines named in Illinois, Wisconsin and Minnesota, to accommodate the region of country lying west of the Great Lakes, is such as to place them in the very first class of main trunk roads.

Description of the Proposed Route.—Character of the surface, and estimate of cost.

The general topographical view which has been presented of the country for the entire distance from Chicago to the Pacific, although sufficient perhaps to show the probability of a favorable route for a railway being obtained, is not complete enough in its details to furnish the requisite data for arriving at a satisfactory conclusion in respect to its gradients and cost, and other circumstances important to inspire confidence in an enterprise of so great magnitude.

Fortunately the information which is wanting, is derivable from various sources to a degree which leaves no doubt of the general character of the proposed route, both in respect to its probable cost, and to its efficiency for the purposes designated, and also in reference to its superiority, when compared with other lines or routes which have been proposed for effecting the same object.

The elevation of Lake Michigan above the sea level is placed by most writers at 578 feet or thirteen feet only higher than Lake Erie, which is known to be 565 feet by several lines of levels carried to the tide water of the Hudson.

The estimated difference of thirteen feet is probably somewhat less than the actual difference. The error, if any, is not important to this enquiry.

Between Lake Michigan and the Mississippi river the surface of the country although considerably varied has no very marked features produced by any very great difference in elevation of its several portions.

Lapham in his work on Wisconsin, states that

"there are no mountains, properly speaking in Wisconsin, the whole being one vast plain varied only by the river hills and the gentle swells or undulations usually denominated *rolling*. This plain lies at an elevation of from six hundred to fifteen hundred feet above the level of the ocean. The highest lands are those forming the dividing ridge between the waters of Lake Superior and the Mississippi. From this ridge there is a gradual descent to the south and south west." This gradual decline of the general surface of the country is continued far down into Illinois. The portion of it from the latitude of Green Bay south is much of it prairie, but there is both in northern Illinois, and southern Wisconsin an ample supply of timber of the best description for railroad purposes, consisting principally of oak, of which the white and burr oak is the most abundant. Pine, of which there is a large supply in northern Wisconsin, is not found in the southern part of the state or in Illinois.

Messrs. Foster and Whitney in their description of the country south of Lake Superior, represent the line of summits which separate the Mississippi, and St. Lawrence system of waters, as being near Lake Superior, and elevated about 1500 feet above the sea. This higher region is primitive in its formation, a character which does not attach to any portion of the country in Illinois or Wisconsin traversed by the line of the proposed railroad.

From Chicago to Janesville and Madison, the capital of Wisconsin, 125 miles, the road as located, is as near to a direct line as it is possible to place it, and differs in length only a fraction of a mile from a perfectly straight line.

The maximum gradient on this portion is forty feet in one direction and 30 feet in the other. The average rise and fall for the entire line being only 16 feet per mile.

From Madison to the Wisconsin, or La Belle river, the preliminary survey gives forty feet per mile as the maximum grade.

The Wisconsin river, which is navigable to the Mississippi near the points of crossing, is 772 feet above the ocean level. If crossed at an elevation of 90 feet above highest water to enable the class of steamers navigating it to pass underneath, which is practicable, as the banks on both sides are in many places sufficiently elevated and bold for the purpose, the grade line will be elevated eight hundred and eighty-two feet nearly above the sea. Distance from Madison 23 miles.

From the Wisconsin river to the t Prairie La Crosse, the distance is estimated at 92 miles. The ground between these points rises to an elevation of about thirteen hundred feet above the sea. Recent examinations show a depression at one point, between the Lemonweir and La Crosse rivers, 200 to 300 feet lower. A preliminary survey extending one-half of the distance, gives for the maximum grade 40 feet per mile and it is quite certain there need be no gradient exceeding that amount for the remainder of the distance to the Mississippi.

At La Crosse the elevation of the line is 700 feet nearly above the ocean level. From thence along the eastern shore of the Mississippi to the head of the Falls of St. Anthony the rise is about 120 feet the estimated elevation of the line at that place being 820 feet.

From the sources of the Lemonweir river, the

line instead of descending to the Mississippi at La Crosse, may be carried along the table land of the interior, where the cost of construction may be less but the line will be more undulating and distance about the same. This line if adopted must be placed far enough from the river to avoid the *culees* or *bassieres*, as the deep ravines are sometimes called, which characterise the valleys of the several tributaries of the Mississippi in the vicinity of the latter river throughout the entire distance in question. Upon this route the line will necessarily approach the Mississippi at the mouth of the La Croix river, the western boundary of Wisconsin and from that point to the Falls will be in the vicinity of the Mississippi river, passing like the other line through St. Pauls the capital of Minnesota, a point named in the charter through that territory.

Upon the river route from Madison to La Crosse the surface is probably more broken and difficult than for the same distance from Madison on the interior route, but on neither are there any difficulties or obstacles of a very serious nature, such as are of frequent occurrence upon railways in the eastern states.

From La Crosse to the Falls of St. Anthony the line occupies a position upon the east bank of the Mississippi, a distance estimated at one hundred and forty-five miles. In this distance are many high bluffs of limestone and sand-rock forming a striking feature in the scenery of that part of the river. These wall-like cliffs have in general, towards their bases, a gradual slope to the water, formed by fragments of rock and earth, detached from the precipice above, the accumulations of ages, affording in connection with the character of the rock and of the river, facilities for the construction of a railway far greater than are usually met with on roads similarly situated in other sections of the country, and much less expensive than the roads now in operation in the valleys of the Hudson, the Delaware or the Susquehanna. Upon this line no gradient higher than 20 or 25 feet per mile will be required, along the river a feature favorable to its adoption, provided it is equally eligible in other respects.

A better point than the Falls of St. Anthony cannot be selected for crossing the Mississippi river with the proposed railroad. One nearly as good may perhaps be found at some one of the Rapids above, if it shall be deemed advisable to continue the line farther up on the east side of the river.

The Falls of St. Anthony are at the head of navigation on the Mississippi for the largest class of boats. The descent of the river at these falls is 51 feet of which about eighteen or twenty feet is perpendicular. The river at the Falls is divided into two channels, by an island which is three hundred feet wide. The channel on the eastern side is 651 feet in width, and on the western 930 feet, making the entire distance from shore to shore across the island 1881 feet.

From the Falls of St. Anthony the direction of the line is such as to keep it within the immediate vicinity of the Mississippi for a distance of 60 to 70 miles. In this distance the valley is more open, and the road can be constructed probably at less cost than along the valley below.

The river then bears to the North to where it finds its sources in the *Hauteurs des terres* or pine covered table lands, which separate its waters from

those of the Red River of the North, and which are elevated 1,000 to 1,700 feet above the level of the sea.

These heights are crossed by the proposed line a little to the North of where the general level of the plateau rises to meet the higher elevation of the *Coteau des Prairies*, which are situated between the waters of the river St. Peters and the river Jacques, and which are elevated in latitude 46° N. 2,000 feet nearly above the level of the sea.

The elevation of the ground therefore at the summit, over which the line passes, is probably 1,700 feet or thereabouts, making from the Falls of St. Anthony an ascent of about 900 feet only, the most of which is to be overcome in a distance of one hundred miles, estimating from the place where the line leaves the vicinity of the Mississippi river as above described.

The view from the highest part of the *Coteau des prairies* is described by Nicolet as "most beautiful, overlooking the immense green turf of the valley of the Red River of the North, and of the forest capped summits of the *Hauteurs des terres* that surround the sources of the Mississippi, and the granite valley of the upper St. Peters."

The elevations above given of the country after leaving the Wisconsin river are derived mainly from barometrical measurements made by I. N. Nicolet, while exploring under the direction of the War department in the years 1836-7-8 and 9, the valleys of the upper Mississippi and Missouri, and the country between them and the Red River of the North; measurements which appear to have been made with much care and skill, and which have been found to be very correct so far as they have been tested by others since made.

The descent of the Red River from lake Traverse to lake Winnipeg, where it is 853 feet above the sea, is estimated by Col. Long, at 200 feet, and as the distance is 600 miles, the average descent is one-third of one foot per mile, which accords nearly with estimate since made by Mr. Owen. The upper portion of the river has a descent undoubtedly greater than this. The river is navigable, and this navigation extends across to the St. Peters, according to Col. Long, so that canoes of two tons burden pass from the waters of the one to those of the other.

The line as proposed crosses the Red River about 40 miles below lake Traverse, at an elevation probably of about 1,000 or 1,100 feet above the sea-level, making the descent from the *Hauteurs des terres* to the place of crossing about 700 feet.

From the Mississippi to the Red River the country is rolling, the surface not being sufficiently varied to have any very strongly marked features, and like the valley of the Mississippi below is well supplied with timber.

From the Red River to the last crossing of the Shayan-ou or main west branch, a distance of about 50 miles the line continues on ground, which if not entirely level has a remarkably even surface, being described by Mr. Owen as a "great savanna," "a dead level plain," "the channels of the streams being formed by excavations in the alluvial deposit, rather than by any depression in the surface of the country," a formation which "extends all the way down the valley".

Col. Long describes it as a "broad expanse of verdant prairie, spreading beyond the utmost ex-

tent of vision, and, excepting the margins of the river and those of its tributary streams, which are fringed with trees and shrubbery, there is very little to interrupt the simplicity and uniformity of the scenery: scarcely is there an undulation to variegate the prospect." The trees which fringe the water courses consist of "several varieties of oak, white and red elm, linden, grey ash, red maple, cotton wood, aspen, hackberry, iron wood, hornbeam, and white and red pine." Col. Long saw no rock in place in the whole extent of the Red River valley from its source to Pembina at the national boundary.

M. Nicolet speaks of the "vast and magnificent valley of the Red River, spreading itself in an almost insensible slope, to the East, to the North, and to the South, and bounded only by the horizon." He describes the Shayan branch as navigable for canoes to near Devil's Lake "its banks well wooded" and as being "conspicuous by the dense green foliage of its shores." Its valley and that of the main river "possesses a fertile soil, offering many inducements to its settlement."

From the Shayan branch the ground rises very gradually to the plateau of the *coteau du Missouri*, the highest part of which it attains in a distance of about eighty miles. Its elevation at this point above the ocean is assumed at 2,300 feet.

Farther south in lat. 45° N. nearly, the elevation of this plateau was ascertained by Nicolet to be 2,100 feet. Its appearance at that point is described as that of a "green plain bounded only by the horizon, and presenting a smooth surface." Farther north in the direction of the proposed line for the road, it is described as a "high dry rolling prairie" presenting but few "inequalities of surface" throughout its entire extent and having an elevation but little different from the *Coteau des Prairies*, both presenting the highest ground to be found between the Gulf of Mexico and Hudson's Bay west of the Great Lakes.

From the valley of the Shayan river to the Missouri a distance of 100 miles the country is destitute of timber, being, it would seem, the only portion of any very great extent on the entire line to the Pacific not supplied with that article. Over this vast prairie plain the bison and the elk still roam in immense numbers.

The highest point on the Missouri river where barometrical measurements were made by Nicolet was at Fort Pierre in lat. 44½° N. nearly. This point he found to be 1456 feet above the sea. It is situated by his estimate, which differs but little from that of Lewis and Clark, 1256 miles by the river from the mouth of the Missouri.

The mouth of the Missouri as derived from the known elevation of Lake Erie, via the Wabash Canal, and the surveys on the Ohio and Mississippi railroad is 380 feet, nearly, above the Hudson river at Albany, N. Y.

The mouth of the Kansas river 382 miles above the mouth of the Missouri is 303 feet higher, or 683 feet above the sea, giving for this portion of the Missouri a descent of 792-1000th feet per mile. From the Kansas river to Fort Pierre, the ascent is 773 feet and distance by the river 887 miles, making the descent of this portion 871-1000th feet per mile. The portion of this below Council Bluffs has an inclination of one and one-sixth feet per

mile, and that above for 583 miles, only three-fourths of one foot per mile.

Although M. Nicolet finds the elevation of the Missouri at Fort Pierre to be 1456 feet yet in order to cover any error likely to occur from measurements made with the barometer, this amount will be increased to 1500 feet. This is believed to be an ample allowance in view of the fact that the more recent measurements of Mr. Owen on the Mississippi give results upwards of 100 feet lower than those obtained by M. Nicolet, owing possibly in part to too low an estimate of the level of Lake Superior.

Between Fort Pierre and the mouth of the Yellowstone, the channel of the river appears to have a less inclination on the average than it has below the former point. This is inferred from the time made by boats ascending and descending. The force of the current offering less resistance to the ascent of boats, on the portion from Fort Pierre north to the Yellowstone than upon the portion below. The Journals of Lewis and Clark and of Culbertson are evidence on this head. As this difference may be due in part to other causes than that of a diminished inclination of the channel, the descent for this portion will be estimated at nine-tenths of a foot per mile, which for 600 miles gives the elevation of line of the road at the mouth of the Yellowstone 2,040 feet.*

This will appear to be a liberal estimate in view of the remark made by Lewis and Clark when opposite the mouth of the Little Missouri, that "the river continues wide and of about the same velocity with the ordinary current of the Ohio." The descent of the Ohio from Pittsburg to its mouth including the falls at Louisville, averages less than six inches to the mile. The portion from Pittsburg to Wheeling, 88 miles, has an inclination of 9-10th of a foot per mile; that of the portion below to Cincinnati is only six inches per mile, while that below Cincinnati is still less than this.

The proposed line approaches the Missouri river, a short distance below Fort Mandan, at a point about 300 miles below the Yellowstone. It will have consequently by the above estimate an elevation at this point of about 1770 feet nearly above the level of the sea.

The valley of the Missouri at this place and below is described as a vast prairie rising very gradually on the east side, presenting in that direction no very marked elevations, the *Coteau du Missouri* being merely in the words of Col. Long, a "grand dyke which prevents the Missouri from flowing eastward," circumstances which in connection with the fact, that the Moose river branch of the Asiniboine approaches within a mile of the Missouri river, at a point farther west and is elevated but little above it, show very conclusively that the *Coteau du Missouri* does not increase much, if any, in altitude north of the latitude of 46°, and that it is quite safe to assume, as has been done, the elevation of the line of the road at its highest point between the Red River and Missouri at 2,300 feet.

So low is the ground where the Moose river approaches nearest to the Missouri that it has been

* Since the above was penned, a letter from Gov. Stevens states, that the Missouri at the mouth of the Yellowstone is 1,100 to 1,200 feet above Fort Snelling. This would give for the mouth of the Yellowstone 1,850 to 2,050 feet above the sea level.

proposed to excavate a channel for the discharge in that direction of the surplus waters of the Missouri in times of flood, allowing them to pass of northerly into Lake Winnipeg. If this is practicable, then it would also be possible to construct a canal from this point to Bigstone Lake on the St. Peters, and by improving the navigation of this river, which it is said can be done at no very great cost, a very direct navigable route may be obtained in connection with the improvement of the Fox and Wisconsin rivers in Wisconsin, now in progress from the Upper Missouri to Lake Michigan and thus avoid the tedious and difficult navigation of the lower portions of the Missouri river: or otherwise, the canal may be continued along the *Haut terres* of the Mississippi and connect at the west end of Lake Superior, by a still shorter route, with the navigation of the lakes.

Such a navigation could also readily be connected with the waters of the Red River and of James river, both of which it is said are susceptible of improvement at no very great cost.

From where the line of the proposed road meets the Mo., to the Great Falls of that river, it occupies the ground on the North side of the river, at no greater distance from it than is necessary to preserve a due degree of directness in its course. The valley of the Missouri on the North side for this distance is mostly a plain, with the surface not greatly varied, its features changing somewhat West of the Muscleshell river between that and Thompsons river, where the surface is more broken and the hills approach nearer to the river.

The character of the Missouri from the mouth of the Yellow Stone to that of the Muscleshell, a distance following its course of 390 miles, as described by Lewis and Clark, is such as to warrant the conclusion that the average inclination of its surface is very little greater than the portion immediately below.

The quantity of water flowing in this portion of the river must be considerably less than in the portion below. The Yellow Stone is the largest tributary of the Upper Missouri, draining an extent of country equal to two thirds of that drained by the Missouri itself at the point of junction.

The dimensions of the two at this point, as given by Lewis and Clark, from actual measurement, are for the Yellow Stone 891 feet in width across the water at the surface and twelve feet deep at its deepest point, and for the Missouri 990 feet in width and the depth greater, the precise depth of the latter, and velocities of the current not being given.

From the Muscleshell river to the Falls of the Missouri a distance of 310 miles by the river, the current is on the average more rapid than upon any equal portion below. Lewis and Clark ascended this distance with their boats at the mean rate of about thirteen miles per day, while the average below was 17 to 18 miles per day. The river is here 600 to 700 feet wide. The most rapid and difficult portion is embraced in the distance of one-third of a mile only. The water is rapid in other places, but not to the same degree as at this. From one foot to one and one-third feet per mile as the maximum, will, it is believed, be a liberal estimate, for the descent of the river from the Falls to the Yellow Stone. This gives for the elevation of the line of the proposed road at the foot of the Falls about 2860 feet.

The character of the portion of the Missouri valley traversed by the proposed road is thus described by Lewis and Clark:

April 14—"Passed low timbered ground."

" 18—"The country presents the same appearance of low plains and meadows, bounded on the right a few miles back by broken hills which end in high but fertile lands, the quantity of timber increasing."

" 18—"Country presents usual variety of high lands (probably about 100 or 150 feet in height, see memo. May 3d.) interspersed with rich plains."

" 21—"Passed Whitworth river." (this is the western boundary of Minnesota.)

" 26—"Arrived at Yellow Stone, wood land and limestone near by."

May 3—"The low grounds much wider, sometimes extend 5 to 9 miles to high lands which are much lower than heretofore not being more than 50 or 60 feet above the low plain."

" 6—"Country continues rich, level, and beautiful, the low grounds wide and comparatively with the other parts of the Missouri well supplied with wood."

" 7-11—"Proceeded at the rate of 20 miles per day through beautiful and fertile plains, which rose gradually from the low grounds bordering its banks to 50 feet, and extended a perfect level at that elevation as far in places as the eye could reach."

" 8—"Passed Milk river."

" 11—"First pine seen on the Missouri, resembles the Virginia pine, leaves longer."

" 12—"Soil changes somewhat, more sand on the hills, plains the same."

" 19—"Character of country changing, cotton wood the only timber and scarce."

" 20—"Arrived at Muscleshell river." Lat. 47° 24' N.

" 21—"Country in the South high and broken: pine and swamp cedar."

" 24—"Grounds higher on each side owing to ridge running N. W. and S. E."

" 26—"Scarcely any low grounds on river."

" 27—"River rapid and bounded by rugged bluffs."

" 28—"Passed Thompsons creek: low grounds on banks again wide, fertile and enriched with trees: those on the North particularly wide, hills low, opening into three large valleys to the North."

" 29—"Passed Judith river 300 feet width."

" 30—"Rocky points." "On ascending heights country perfectly level on both sides of the river."

" 31—"High walls of black rock and white sandstone."

June 2—"Timber increases in quantity, low grounds more level and extensive and bluffs lower."

" 8—"Maries river. Lat. 49° 25' N."

" 12—"Left Maria's river."

" 13—"Beautiful plain. Arrived at Great Falls: river 900 feet wide, bluffs 150 to 200 feet high."

In giving a general description of the valley of the Missouri in another place, Lewis and Clarke

state that the hills exceed 150 feet in height for some distance below the Mandan village, but above that point "they are rather lower to the neighborhood of the Muscleshell river, where they are met by the northern hills which have advanced at a more uniform height, varying from 150 to 200 or 300 feet. From this point to the mountains, the height of both is nearly the same, from three hundred to five hundred feet, and the low grounds are so narrow that the traveller seems passing through a range of high country. From Maria's river to the Falls, the hills descend to the height of about 200 or 300 feet."

The above description is confirmed by Mr. Culbertson, who ascended the Missouri in 1850, (as appears by his Journal, published in the transactions of the Smithsonian Institute,) to a point above Porcupine river. From Fort Clarke near the site of the old Fort Mandan the valley is represented by him as "prairie," with "hills sixty feet in height" as far up as the Yellow Stone. Above that point the "hills are lower," "country more level," and "banks well timbered." At a distance of about 60 miles the "hills leave the river and a broad bottom intervenes." At 80 miles "prairie to north and hilly to south," "country more even," "good timber." At 90 miles Martha's river, "very wide rolling prairies, on north side no hills." Below Milk river, "very extensive and level prairie to the north." Between Milk and Porcupine rivers, "in midst of most magnificent prairies," Above Porcupine river "continuation of prairie country, especially on the north side," "beautiful rolling prairie all along, excepting occasional timbered points."

From the preceding it is evident that the valley of the Missouri from Fort Mandan to the Great Falls, is an immense plain, particularly on its north side, and principally prairie, interrupted only by the broken region between the Muscleshell and Thompson rivers, a character which belongs from all accounts to the entire space between the Missouri and Saskatchewan, and Assiniboine rivers. In all this distance of nearly 500 miles, the valley appears to rise very gradually at the average rate of about two feet per mile. This, in connection with the very favorable character of the surface, as described between the Missouri and Mississippi rivers, leads to the conclusion that in the entire distance, from the latter to the Great Falls of the former, embracing nearly one thousand miles, no gradient will be required exceeding 25 to 30 feet per mile. The road can be located on long straight lines, with but comparatively few changes in direction, and the grading will, in general, be light.

The line of the road for more than half of the distance will not be very far from the navigable waters of the Mississippi and Missouri. With respect to timber for construction it is apparent that the borders of the Missouri and its branches, from Fort Mandan to the Falls are in general fringed with it, and when not found on the river banks can be procured without difficulty from the branches or from parts of the river which are better supplied with it.

To be continued.

III. Central Railroad.

Mr. M. B. Edgar has been elected Treasurer of the Illinois Central Railroad. Mr. Burrell re-

Development of the Locomotive.

It is a common and very true saying that "there is one right way for everything," and accordingly all efforts for improvement tend to reach a general standard of perfection. This has been equally true in the case of the Locomotive engine as with other works of human invention and adaptation. In the early days of steam locomotion there was a great diversity of style in the engines of different builders, but since every arrangement and proportion of the Locomotive has been the subject of full and intelligent investigation, at the hands of able engineers, machinists, and managers, these different styles have been assimilated to a general standard, in which all the good points of previous patterns have been retained and combined, while the improved and nearly perfected result of these combinations bears little general resemblance to any of the primitive elements from which it has grown into shape. The Locomotive of 1853 represents a general style, essentially the same wherever constructed throughout the country, while the engines of 1840 were of as many styles as there were builders, and were all as diversified in construction as they could well be, when designed, all for the same service and necessarily of nearly the same weight and dimensions.

This assimilation of style is the result of improvement, for while the engine remained imperfect there were as many advocates for one arrangement or system of proportions as another. The inside connected "crank" engine was an imperfect arrangement, unmechanical in principle, and although fast going out of use, is, we are sorry to say, still built and adopted in some quarters. On the other hand, the inclined cylinders and want of balances were objections to the "outside" connected engine, and operated to throw that engine into discredit, from which the improvements of more recent times have not yet entirely reclaimed it. The principle maintains, however, for the recent engines with horizontal cylinders and counterbalanced drivers are better than either of the former arrangements; being equally as steady as the one and possessing all the acknowledged advantages of the other.

It is a matter of considerable interest to trace the features of the Locomotives of different times and of different makers, and to know why, and to what extent, they have been superseded by other arrangements.

In 1840 there were three prominent styles of Locomotives built in different parts of the country. The inside connected, English pattern, built at Lowell, Massachusetts, by the Locks and Canals Company; the "half crank" engines built by H. R. Dunham & Co., of New York city, and Matthias W. Baldwin, of Philadelphia; and the outside connected engine, of which William Norris, of Philadelphia, was the leading builder.

Beyond these leading distinctions of arrangement there were others embraced in the details of machinery, each of which, in its place, was fully as distinctive in its features. The Locks and Canals engines had the English construction throughout. Single drivers and rigid leading and trailing wheels were among their prominent characteristics.

They had the "wagon top" furnace, and were built with a system of framing that would appear startling if preserved in its full proportions upon the heavy engines of our own times; if indeed we

have any gauge that would admit of it. The crank axle was supported by six bearings, of which four carried a share of the weight of the engine. It is not our purpose, however, to particularize these distinctions with much minuteness, as the large number of the engines which were built at Lowell and the extreme strength of their construction have kept them in existence in their original form on many of our roads up to the present time.

The "half crank" engine was not probably as generally introduced. This plan of engine had outside cylinders, or cylinders placed on the outside of the smokebox, while the connecting rod was applied to a crank wrist just inside of the wheel. This bearing of the crank was connected with the main part of the axle by a single "cheek" on one side, and was either continued straight through the wheel on the other, or else had a second "cheek" sunk in the body of the wheel, by which it reached the center and sustained an outer bearing. This was, of course, a clumsy, unmechanical arrangement, having most of the faults of the "full crank" engine, while it necessarily involved an outside frame with outside bearings, and a long reach of boiler braces, and in the case of coupled drivers, the use also of extra cranks keyed onto the axles, and coupling rods at a distance of 16 or 17 inches from the tread of the wheels. It also limited the capacity of the engine on the narrow gauge. From these many disadvantages this arrangement is no longer built, although as late as 1848 the New York and Erie railroad adopted it very generally, from a conviction that their road was too wide for an outside connection, and that the inside connected engine was not a good one. The inside connection has, however, been generally adopted at a later day, and this fact is one unfortunate feature of the broad gauge, for while possessing, at least, very doubtful advantages, it almost necessarily involves a "crank engine."

The outside connected engine built in 1840, by William Norris, was the most elegant and successful example of the Locomotive then in use in this country. It combined great simplicity of construction with some improvements of arrangement which have become generally adopted. The truck was one distinctive and valuable feature without which no engine of the present day is constructed. The inside frame was adopted. The use of coupled drivers at a little later period, adapting the engine to its own increased weight, consequent upon an increased capacity given at the same time, and also to the heavy grades upon which it was often called to work was another great step towards the improvement of the engine. The Locomotive of 1844, built by Norris, was nearer the standard to which other improvements have tended and to which other patterns have assimilated, than any others of cotemporary or previous construction.

During the year of 1840 another style of outside connected engine was commenced in Boston. This was the commencement of the New England style which, in its changes from out to inside connections and back, has prevailed in all of the designs originating in that quarter up to the present day. The original pattern had the distribution of weight adopted by Norris, the form of boiler adopted in the English pattern, and a cylinder connection, pump, and a general style of frame and finish original with itself. The cylinder connection was

made wholly to the frame and independent of the boiler. The pump was worked on a short stroke. The frame was of the riveted kind which is still retained in the Boston engines, and had inside bearings, like Norris', with the addition of an outer rail for the support of the cylinders, valve motion and pumps.

In 1845 the crank engine was revived at the Boston Locomotive Works and a peculiar style was soon after introduced. The separate cut off valve, which had become generally popular was contained in the new engine. The short stroke pump was preserved. A truck of a new kind was adopted. Altogether the engine was the most original in its arrangement of any pattern which had appeared since 1840, and considering the character of Locomotives at that time was quite creditable to the builders.

By 1850 the Paterson style of engine, which had long been before the public, came out in an improved form, and the improvements which have rapidly followed in these engines, since that time, have distinguished them as the best in the country. They have brought out the link motion in this country perfected to work with great accuracy and efficiency; they have made the most general application of the center bearing truck, double domes, and the expansion brace, and have given us a boiler combining all the advantages of the dome and "wagon top," without the disadvantages of either. The steadiest running outside connections were turned out here, when the builders commenced giving greater attention to counterbalancing and to bringing down the cylinders to a level. And for efficient evaporative power and communicating capacity, and for general excellence of material and thorough workmanship these engines have earned a wide reputation. The Paterson style of passenger engine is now the leading style of this country, and as a proof of the fact its arrangements and proportions are the most copied by other builders.

In the South, Winans has established a plan for the burden engines of the undulating and crooked roads in that section. He has done much, and in fact nearly all that has been successfully done, to develop the coal engine, having enlarged the grate, introduced the movable grate bar, and adopted and perfected the variable exhaust and draft pipe in the smoke box. He has distributed the weight of his engine on a large number of points, besides bringing the whole into a short wheel base, adapted for short curves. The chilled wheel has been a good feature of his engines, compared with the old wrought tire, and had the chilled surface been made removable by the greatly improved method of applying the slip tire there would have been nothing left imperfect in the adaptation of the driving wheels.

While the general arrangement of the Locomotive has been so diversified in the hands of different builders, at different periods, the details of the machinery have been equally the subjects of a great variety of patterns and changes. We have had the dome boiler, the wagon top, and the elevated crown of the present day. We have had frames made from riveted bars with cast iron and wrought iron pedestals and braces, offset frames and trussed frames; the trucks have been made with outside and inside journals and with both, with side and with center bearings and with both

combined and with various kinds of spring suspensions; the valve motion has been the lap valve, separate cut off, direct and indirect attachment, vee hooks, drop hooks, and shifting and stationary link motions, besides the graduated variable cut off; the slides have been of cast iron and wrought iron, single and double, hexagonal, square, round and flat; all parts of the structure of the engine have been varied either through necessity, caprice, or efforts for improvement, while the result, combining the arrangement and details which experience has sanctioned, is now before us in the standard Locomotive engine of the present day.

There is generally far less difference in the construction of engines, by different builders, now than at any previous time and there is less reason for difference. The merits, the purposes, and the consequent structure of the engine are better understood. The multiplication of railroads has brought the inventive faculty on to common ground, as the old Eastern shops build less for roads in their own vicinity than for Western roads where they are compelled to compete directly with every builder in the country. The competition of railroads themselves has been the most important cause of improvement and consequent assimilation of style. The demands of modern travel have called for greater power and economy, and the means of superiority, developed in the efforts to reach these ends, have been incorporated into the patterns of all successful builders.

The adaptation of Locomotives, of which we have before spoken, is regarded as of much more importance than formerly. A few years ago one builder would have two or three sizes of the same pattern, whereas now the distinctive nature of freight, express, and local passenger traffic, ballasting and yard work, call for more extensive adaptations of the engine, not for mere purposes of difference in construction, but difference in employment. Then an equipment of engines, ordered from one builder, no matter how varied their application to the business of the road, would be alike in arrangement and construction; from different builders they would be essentially different in these respects, and yet no better adapted as a whole to the wants of the road. Now, one equipment suited for all the various wants of any road can be had from one builder, while if ordered from different builders the general features of the work will not be essentially varied.

The great march of improvement in the American Locomotive may be measured by three steps; the first, the machines of 1840, which had no provision for expansive working, and were of the most primitive style that have survived the renewals of the service, and came down to us in their original form; the second, the engines of 1848, when the redoubtable "inside connection" was in its glory, and when short stroke pumps and expansive gear acting by separate valves were in fashion. The engines of this period reached the height of complication, and since then have been gradually simplified up to the present time. And third, the standard style of engines of the present day, the most complete examples of which are based upon the Paterson model, and which generally, for what they accomplish in the economy and efficiency of steam and for the qualities they possess adapting them to run steadily, are the

simplest engines that have ever appeared. Their distinguishing traits of simplicity and superiority are the modern form of boiler with double domes, the straight flame, the center bearing truck, low centre of gravity, counterbalanced drivers, nearly horizontal cylinders, the link motion, the expansion brace, and some minor details, all tending to the same result.

The importance which old settled roads will come to attach to uniformity in their equipments, a matter which has already, in many cases, influenced the apportionment of contracts, will in the succeeding period of five or six years extinguish those differences of construction which are now looked upon as merely due to the difference in the taste of the builders, and the standard style of American engine, will come to be more generally built. The only claim which will be regarded as a legitimate ground for differences of construction will be that of the adaptation of engines, and that, in our opinion will be far more considered than it has been.

And this general assimilation of style will be universal, modified only by the circumstances to which they must be adapted. In England, where much of the machinery of the Locomotive has reached a higher state of perfection than elsewhere, the increased use of coupled drivers affords one instance of this general tendency. The outside connection of which many have been built in England, will yet supersede the "crank engine," a result which is certain to be accomplished in time, not only there but everywhere, except those lines unfortunately inflicted with a "broad gauge."

Carhart's Turn Table.

We find the following notice of Mr. D. M. Carhart's turn table in the Jersey City *Sentinel and Advertiser*;

The new turn table that has been in process of construction for the New York and Erie railroad at this place is completed, we learn, to the entire satisfaction of the said Co., and meets with general encomiums from all we have heard speak of it, except a few who are very limitedly engaged in the business. This turn table is capable of being turned by one man in the almost incredible short space of 28 seconds, with an engine and tender of 35 tons weight. The builder, Mr. D. M. Carhart, (formerly of Jersey City) has secured letters patent on this method of turn tables, and is engaged at present in building them on 11 different roads in N. Y., Pa., Ohio and Ind.—they have been universally adopted on all the roads in the State of Ohio, and have met with general favor, we should judge, from the flattering letters from different Co's. Railroad Co's. who have not used them would do well to examine Carhart's references, as advertised by him in the New York *Railroad Journal*.

Northwestern, Penna. and Cleveland and Mahoning Railroads.

The Cleveland Board of Trade recently adopted the following preamble and resolutions relative to these roads.

Whereas, the Northwestern (Pennsylvania) railroad, in connection with other roads completed and in progress, will form a continuous railroad communication with an unbroken gauge between this city and Philadelphia, upon a much shorter and better line than any heretofore constructed or projected, thereby opening to the Lake commerce and the Northwestern States a new and very valuable outlet for their trade to the great manufacturing city of the Union, and promising to develop most important commercial connections from which we have been heretofore to a great extent excluded—therefore,

Resolved, That the Board of Trade of the City of Cleveland looks with great interest to the efforts now making to construct the Northwestern railroad, and believe the interests of this City and of the Lake commerce generally to be materially concerned in their success.

Resolved, That we look forward to the completion of a continuous railroad line from this city to Philadelphia, via the Cleveland and Mahoning, the Northwestern, and the Pennsylvania railroad, as destined to create new and very extensive commercial relations between the Northwestern States and Philadelphia, and to establish new markets for the commerce of the Lakes.

Ordered to be published in the papers of the City of Cleveland.

S. L. WEATHERLY, President,
J. M. ISAACS, Secretary.

Fort Wayne and Southern Railroad.

The Annual Election for Directors of the Fort Wayne and Southern Railroad came off on Wednesday the 5th ult., and resulted in the choice of

Wm. Rockhill of Allen county, John Studibaker of Wells, Jacob Brough of Blackford, Charles Carter of Delaware, E. T. Hickman of Henry, J. L. Robinson of Rush, Joseph Holman of Wayne, I. T. Gibson of Decatur, B. Phillips of Jennings, E. G. English of Scott, James G. Read of Clark, J. S. McDonald of Floyd, W. J. Holman of Miami.

The officers of the Company are, W. J. Holman, President; E. G. English, Vice President; D. T. Haines, Secretary; Wm. F. Jones, Treasurer.

The Stock of the Company already closed up, is said to be \$1,000,000, and \$4,000,000 more offered, about one-half of which has been obtained in the last month. The road will be 198 miles long, from Fort Wayne to the Falls of the Ohio River. Sixty-four miles of it, from Fort Wayne to Muncie, is under contract—the grubbing, clearing, and much of the grading done. It is intended, if possible, to have this portion of the road completed during the course of the coming year.

Iron, Coal and Timber.

The Evansville, Indianapolis and Cleveland straight line railroad has been located through Pike, Daviess, Green and Owen counties, in Indiana, of the mineral and vegetable resources of which, David Daie Owen thus speaks in his geological report.

"The coals of this Indiana coal field may be designated as of the fat bituminous character, like those of Derbyshire, Wigan, and Lancashire in England, and Lanarkshire in Scotland. Though the amount of carbon is not as great as that of many of the Eastern coals for completeness of combustion, yet a rapidity of ignition, freedom from waste, and for the purpose of rapid evaporation, they hold the first rank amongst both foreign and domestic coals; indeed they are capable of generating steam, and bringing a boiler to a steady action quicker than any other coals in the market—one pound of these coals can produce from six to seven pounds of steam. They are not apt to obstruct grates with clinker, they are also well adapted for the production of illuminating gas; and some of the beds afford a coal that for heating power and freedom from impurity, surpass the Splint and Cannel coal of Scotland. Coal obtained from one of the lower beds of this coal field, brought a boiler into steady action in just half the time required to procure the same effect with Cumberland Coal. The locations of coal are too numerous to mention, many of the beds attain a thickness of from four to ten feet or more."

"The iron ores are extensive and important, and must ultimately afford a permanent supply of cast iron and steel, not only for consumption, but for shipment. The geological formation through which these works extend, is such as to warrant that much remains yet to be discovered and developed which still lies hidden beneath the deep and rich soils and luxuriant vegetation. The whole of Pike county may be said to support as fine and thrifty a body of white oak timber, as is

to be found in Indiana or perhaps in any portion of the West. There are many trees four feet through. Green, Owen, and Morgan contain fine white oak and poplar."

American Railroad Journal.

Saturday, November 5, 1853.

Railroad to the Pacific.

On our first page will be found the commencement of a somewhat elaborate treatise, or essay, upon the subject of a Railroad from the Eastern States to the Pacific, from the pen of E. F. Johnson, Esq., a gentleman well known to the public, and to his brethren, as one of the most accomplished and scientific members of the profession. Mr. Johnson undertakes to prove the superiority of the extreme northern, and brings in support of his proposition, an array of evidence possessed by no other route. His pamphlet will fill about 35 pages of the *Journal*. He illustrates his arguments by a set of *Maps* prepared by himself, and which will accompany our next issue.

The subject of a railroad to the Pacific is soon to become one of paramount interest throughout the whole country. The time for action has arrived, and whoever can throw light upon the project, contributes something towards the advancement of this great work. We believe Mr. Johnson has rendered a valuable service. He has thoroughly examined, and presented the evidence in favor of one route, and believes he has demonstrated its superiority to all others. Whether he has done so or not, his investigations will stimulate others of a similar character in reference to other routes, and will be the means of placing before the public at an early day, the evidence necessary to determine which of those proposed will best meet all the conditions of a work adapted to the wants of the whole country.

Mr. Johnson's treatise will be subsequently published in a pamphlet form for general circulation.

Share and Money Market.

The stock market has exhibited much more steadiness during the week just passed, than characterized it a few days previously, and yet, there are unmistakable symptoms of weakness, arising partly from the continued scarcity of money, but more, probably, from a want of confidence in the stability of monetary affairs and securities generally, in the future. Because war, and news of war, affects the prices of consols and railway shares and bonds in London, and the transactions at the Bourse in Paris, the "bulls" and "bears," and the good money lenders in Wall street, would fain have us believe that the same news may continue its effects across three thousand miles of barren ocean, and place in jeopardy our railways, our lands, towns, cities, counties and States. And while all are waiting to settle things somewhat in their own minds, prices suffer a little depression; then all take hold and we see another rally, which lasts till the next arrival; when, very likely, the same scene will be repeated. These facts do not argue doubts as to the actual merits of the stocks, operated in, but show the exceedingly nervous and feverish temperament of Wall street, and how much more, floating reports and mischievous surmises, have to do with the fluctuations in the pri-

Railway Share List,

Compiled from the latest returns—corrected every Wednesday—on a par valuation of \$100.

NAME OF COMPANY.	Miles open.	Capital paid in.	Funded debt.	Tot. cost of road and equipmt.	Gross Earnings for last official year.	Net Earnings for last official yr.	Dividend for do.	Price of Shares.
Atlantic and St. Lawrence... Maine.	150	1,538,100	2,978,700	5,150,278	254,743	113,520	none	82
Androscoggin and Kennebec... "	55	809,378	1,016,500	2,064,458	140,561	80,053	none	86
Kennebec and Portland... "	72	952,621	29,80	2,511,067	168,114	100,551	none	45
Port., Saco and Portsmouth... "	51	1,355,500	123,884	1,459,384	208,669	11,251	6	98½
York and Cumberland... "	20	285,747	341,100	713,605	23,916	11,251	none	—
Boston, Concord and Montreal. N. H.	93	1,649,278	622,200	2,540,217	150,538	79,651	none	35
Concord... "	35	1,485,000	none	1,485,000	305,805	141,836	8	107½
Chester... "	54	2,078,625	720,900	3,002,094	287,768	55,260	5	48
Northern... "	82	3,016,634	none	none	328,782	163,075	5	45½
Manchester and Lawrence... "	24	717,543	none	none	none	none	6½	90
Nashua and Lowell... "	15	600,000	none	661,214	132,515	51,513	8	109
Portsmouth and Concord... "	47	none	none	1,400,000	none	none	none	—
Sullivan... "	26	none	none	673,500	none	none	none	21
Connecticut and Passumpsic... Vt.	61	1,097,600	550,000	1,745,516	none	none	none	27
Rutland... "	120	2,486,000	2,429,100	5,577,467	495,397	266,539	none	35
Vermont Central... "	117	8,500,000	3,500,000	12,000,000	none	none	none	13
Vermont and Canada... "	47	1,500,000	none	1,500,000	Leased to the Vt. C.	cent.	100	—
Western Vermont... "	51	392,000	700,000	none	Recently opened.	none	none	—
Vermont Valley... "	21	none	none	none	none	none	none	—
Boston and Lowell... Mass.	28	1,830,000	none	1,995,249	388,108	130,881	7½	91½
Boston and Maine... "	83	4,076,974	150,000	4,092,927	659,001	338,215	7	102½
Boston and Providence... "	53	3,160,390	390,000	3,546,214	469,656	227,434	6	86½
Boston and Worcester... "	69	4,500,000	425,000	4,845,967	758,819	331,206	7	101
Cape Cod branch... "	28	421,295	171,800	633,906	60,743	30,056	2½	45
Connecticut River... "	52	1,591,100	193,500	1,801,946	229,004	72,028	5	55
Eastern... "	75	2,850,000	500,000	3,120,391	488,793	241,017	7½	92
Fall River... "	42	1,050,000	none	1,050,000	229,445	99,589	8	106½
Fitchburg... "	66	3,540,000	112,305	3,623,073	574,574	232,787	6	94
New Bedford and Taunton... "	20	500,000	none	520,475	164,230	43,950	7½	117
Norfolk County... "	26	547,015	819,743	1,245,927	67,251	23,415	none	60
Old Colony... "	45	1,964,070	282,300	2,293,534	322,213	101,510	none	90½
Taunton Branch... "	12	250,000	none	307,136	137,406	24,399	8	—
Vermont and Massachusetts... "	77	2,140,536	1,001,500	3,203,333	218,679	18,648	none	13½
Worcester and Nashua... "	45	1,134,000	171,210	1,321,945	162,109	66,900	4½	59½
Western... "	155	5,150,000	5,319,520	9,953,759	1,339,873	683,194	6½	99
Stonington... R. I.	50	none	467,700	none	240,572	110,892	—	60
Providence and Worcester... "	40	1,457,500	300,000	1,731,498	253,690	139,514	6	—
Canal... Comm.	45	none	none	none	none	none	none	—
Hartford and New Haven... "	72	2,350,000	800,000	3,150,000	639,529	204,269	10	122
Housatonic... "	110	none	none	2,500,000	329,041	168,902	none	—
Hartford, Prov. and Fishkill... "	50	none	none	In progress	69,629	none	none	—
New London, Wil. and Palmer... "	66	558,861	800,000	1,511,111	114,410	none	—	—
New York and New Haven... "	61	3,000,000	1,641,000	4,978,487	806,713	428,173	7	96
Naugatuck... "	62	926,000	440,000	none	none	none	—	—
New London and New Haven... "	55	750,500	650,000	1,380,610	Recently opened.	none	45	—
Norwich and Worcester... "	54	2,121,110	701,600	2,596,488	267,561	116,965	4½	51½
Buffalo and New York City... N. Y.	91	900,000	1,550,000	2,550,500	Recently opened.	none	85	—
Buffalo, Corning and N. York... "	132	none	none	In progress	none	none	65	—
Buffalo and State Line... "	69	879,636	872,000	1,921,270	Recently opened.	—	130	—
Canandaigua and Niagara F... "	50	none	none	In progress	none	none	—	—
Canandaigua and Elmira... "	47	425,500	582,400	987,627	76,760	39,360	none	68
Cayuga and Susquehanna... "	35	687,000	400,000	1,070,786	74,241	23,496	none	—
Erie, (New York and Erie)... "	464	9,612,995	24,003,865	31,301,806	3,537,766	1,691,621	7	71½
Hudson River... "	144	3,740,515	7,046,395	10,527,654	1,063,659	338,782	none	65
Harlem... "	130	4,725,250	977,463	6,102,935	681,445	324,494	5	51½
Long Island... "	95	1,875,148	516,246	2,446,391	205,068	44,070	none	27½
New York Central... "	504	22,858,600	2,111,824	24,974,423	none	none	—	110
Ogdensburg (Northern)... "	118	1,579,969	2,969,760	5,133,834	480,137	195,847	none	27½
Oswego and Syracuse... "	35	350,000	201,500	607,803	90,616	43,600	4	70
Plattsburg and Montreal... "	23	174,042	131,000	349,775	Recently opened.	none	—	—
Rensselaer and Saratoga... "	25	610,000	25,000	774,495	213,078	96,737	—	—
Rutland and Washington... "	60	850,000	400,000	1,250,000	Recently opened.	—	—	—
Saratoga and Washington... "	41	899,800	940,000	1,892,945	173,545	135,017	none	30
Troy and Rutland... "	32	237,690	100,000	329,577	Recently opened.	—	—	83
Troy and Boston... "	39	430,936	700,000	1,043,357	Recently opened.	none	—	—
Watertown and Rome... "	96	1,011,940	650,000	1,693,711	225,152	116,706	8	100
Camden and Amboy... N. J.	65	1,500,000	none	4,327,100	1,388,238	478,417	10	145
Morris and Essex... "	45	1,022,420	128,000	1,220,320	149,941	79,254	4	—
New Jersey... "	31	2,197,840	476,000	3,245,720	603,942	316,251	10	130
New Jersey Central... "	63	986,106	1,500,000	2,379,880	260,899	124,744	3½	—
Cumberland Valley... Penn.	56	1,184,500	13,000	1,265,143	118,617	76,890	5	—
Erie and North East... "	20	600,000	none	750,000	Recently opened.	—	—	125
Harrisburgh and Lancaster... "	86	830,100	713,227	1,702,528	265,227	106,927	8	—
Philadelphia and Reading... "	95	6,656,282	10,427,800	17,141,957	2,480,626	1,251,987	7	71½
Philad., Wilmington and Balt... "	98	8,950,000	2,409,976	6,513,886	697,735	293,501	5	78½

Railway Share List,

Compiled from the latest returns—corrected every Wednesday—on a par valuation of \$100.

NAME OF COMPANY.	Miles open.	Capital paid in.	Funded debt.	Tot. cost of road and equipment.	Gross Earnings for last official year.	Net earnings for last official yr.	Dividend for do.	Price of shares.
Pennsylvania Central..... Penn.	250	9,768,155	5,000,000	13,600,000	1,943,827	617,625	92½	
Philadelphia and Trenton.... "	30							
Pennsylvania Coal Co..... "	47							
Baltimore and Ohio..... Md.	381	9,188,300	9,827,123	19,542,307	1,325,563	615,387	7 46	
Washington branch..... "	38	1,650,000		1,650,000	348,622	216,237	8	
Baltimore and Susquehanna.. "	67				413,673	152,526		
Alexandria and Orange..... Va.	55			In prog.				
Manassas Gap..... "	27			In prog.				
Petersburgh..... "	64	769,000	173,867	1,163,928	227,593	72,370	7 77	
Richmond and Danville..... "	73	1,372,324	200,000	In prog.				
Richmond and Petersburg.. "	22	685,000		1,100,000	122,861	74,113	none	
Rich., Fred. and Potomac.... "	76	1,000,000	503,006	1,531,238	251,370	113,256	7 105	
South Side..... "	62	1,328,722	800,000	In prog.				
Virginia Central..... "	107	1,400,100	446,036	In prog.	176,485	74,902	none	
Virginia and Tennessee..... "	60	3,000,000	1,500,000	In prog.			none	98
Winchester and Potomac.... "	32	180,000	120,000	416,532	89,770		12	
Wilmington and Raleigh.... N. C.	161	1,338,878	1,134,698	2,965,574	510,033	153,893	6	
Charlotte and South Carolina. S. C.	110							
Greenville and Columbia.... "	140	1,004,231	300,000	In prog.				
South Carolina..... "	242	3,858,840	3,000,000	7,002,396	1,000,717	609,711	7 125	
Wilmington and Manchester. "				In prog.				
Georgia Central..... Ga.	191	3,100,000	306,187	3,378,132	945,508	508,625	8 115	
Georgia..... "	211	4,000,000	1,214		934,423	456,468	7½	
Macon and Western..... "	101	1,214,283	168,000	1,596,283	296,58	153,697	9 109	
Muscogee..... "	71			In prog.				
South Western..... "	60	586,887	150,000	743,525	129,395	71,535	8	
Alabama and Tennessee River Ala.	55			In prog.				
Memphis and Charleston.... "	93	776,259	400,000	In prog.				
Mobile and Ohio..... "	33	879,868		In prog.				
Montgomery and West Point. "	88	688,611		1,330,960	173,541	76,079	8	
Southern..... Miss.	60							
East Tennessee and Georgia. Tenn.	80	835,000	541,000	In prog.				
Nashville and Chattanooga.. "	125	2,093,814	850,000	In prog.				
Covington and Lexington.... Ky.	38	1,430,150	1,100,000	In prog.				
Frankfort and Lexington.... "	29	357,218		584,902	87,421	44,254	80	
Louisville and Frankfort.... "	65							
Maysville and Lexington.... "				In prog.				
Cleveland and Pittsburgh.... Ohio.	100	1,239,450	1,371,000	2,963,750	194,423	123,300	6 93	
Cleveland, Painesv. and Ash.. "	71							
Cleveland and Columbus.... "	135	3,027,000	408,200	3,655,000	777,79	483,45	12 161	
Columbus, Piqua and Indiana. "	46			2,000,000				98
Columbus and Lake Erie.... "	61							
Cincinnati, Ham. and Dayton "	60	2,100,000	500,000	2,650,653	321,793	200,967	99	
Cincinnati and Marietta.... "				In prog.				72½
Dayton and Western..... "	40	310,000	550,000	925,000	Recently	opened.	80	
Dayton and Michigan..... "	20			In prog.				
Eaton and Hamilton..... "	36							70
Greenville and Miami..... "	31							
Hillsboro..... "	37			In prog.				
Little Miami..... "	84	2,370,784		2,634,157	526,740	314,670	10 119½	
Mansfield and Sandusky.... "		900,000	1,000,000	1,855,000				
Mad River and Lake Erie.... "	167	2,387,200	1,767,000	4,110,148	540,518	113,401	95	
Ohio Central..... "	57			In prog.				
Ohio and Mississippi..... "								97
Ohio and Pennsylvania..... "	187	1,750,700	2,450,000		Recently	opened.		
Ohio and Indiana..... "				In prog.				
Scioto and Hocking Valley.. "								
Toledo, Norwalk and Cleve'd "	87	552,000	800,000	1,317,140	Recently	opened.		
Xenia and Columbus..... "	54	1,092,137	119,500	1,257,714	237,500	185,363	15	
Evansville and Illinois.... Ind.	31			In prog.				
Indiana Central..... "								
Indiana Northern..... "	131				Recently	opened.		
Indianapolis and Bellefontaine "	83							105
Lawrenceburg and Ind..... "				In prog.				82
Lafayette and Indianapolis.. "	62				Recently	opened.		78
Madison and Indianapolis.... "	88	1,650,000	750,000	2,400,000	516,414	268,075	10 85	
Peru and Indianapolis..... "	40			In prog.				70
Terre Haute and Indianapolis "	72	632,387	663,100	1,353,019	105,944	71,446	4 108	
Rock Island and Chicago.... Ill.								
Chicago and Mississippi.... "	113	2,400,000	4,000,000	4,600,000				
Illinois Central..... "								136
Galena and Chicago..... "	92	1,932,361	500,000	In prog.	473,548	286,152	124	
Michigan Southern..... Mich.	315	2,499,410	2,629,000	6,480,240	592,137	293,043	118	
Michigan Central..... "	282	1,000,000	4,067,396	8,614,198				106½
Pacific..... Mo.	89	1,000,000	none	In progress	Recently	opened.		

ces of stocks at the Board, than any reliable intelligence as to the cost, earnings and expenses of the enterprises whose credit they represent. We annex sales of shares of some of the leading lines each day.

	Hudson N. Y.	N. Y. & Erie.	River.	Cent.	Har.	N. H.
Thursday.....	74½	66	111½	53	100	
Friday.....	73¾	65	110½	52½	100	
Saturday.....	74	65	109	51½	99½	
Monday.....	73¾	65½	110	51¾	98	
Tuesday.....	73½	65	110	51¾	96	
Wednesday.....	73½	65½	110	51½	96	

Michigan Central closed at 107. Cincinnati, Hamilton and Dayton at 98. Reading 71¾; Norwich and Worcester 52, and Stonington 60. After adjournment of the Board on Wednesday, the following sales by auction, of railway bonds were made by Simeon Draper, Esq.

50,000 Columbus, Piqua and Indiana railroad first mortgage.....	65
7,000 Buffalo, Corning and N. York railroad first mortgage.....	80½
5,000 Buffalo, Corning and N. York railroad first mortgage.....	80
18,000 Corning and Blossburg railroad, first mortgage.....	60
20,000 Michigan Central Convertibles 8s.....	102
20,000 Troy and Boston railroad mortgage....	71
15,000 Junction Railroad, Ohio, first mortgage.....	91
5,000 Pacific Mail Steamship Co.....	70
5,000 Miss. and Rock River Junction railroad first mortgage.....	65
4,000 Miss. and Rock River Junction railroad first mortgage.....	65
4,000 Miss. and Rock River Junction railroad first mortgage.....	62
4,000 Miss. and Rock River Junction railroad first mortgage.....	60
5,000 Stock Erie and North East railroad....	106

Those bonds which would not bring the amount for which they were pledged, were withdrawn. The unprecedented earnings of the railways now, and the low prices of shares consequent upon the present stringency in the money market, make the stocks of the leading lines favorites investment with monied operators.

Money, though a trifle easier in the street is still a "cash" article with the Banks. They curtailed their loans over two millions more last week making over fourteen millions since the 6th August last. A business community which can prosecute its legitimate transactions under this immense reduction of accommodation can be in none other than a sound and prospering condition. Why the Banks should pursue this course, to such an extent, toward customers who must have extended their business under the expectation of a continuation of their usual line of discounts, is unaccountable as that the results have not been much more disastrous. We can hardly see how the Banks can expect their bills receivable to be promptly met, while they suddenly contract their accommodations to their customers at the rate of two millions per week.

The following figures show the condition of the Banks, Aug. 6th, Oct. 22d, and 29th.

	Aug. 6th.	Oct. 22d.	Oct. 29th.
Loans.....	97,899,199	85,367,981	83,400,321
Specie.....	9,746,441	10,303,253	10,866,672
Circulation.....	9,518,953	9,389,542	9,300,350
Deposits.....	60,579,797	55,748,739	53,325,462

The net amount subject to the draft of the Secretary of the Treasury on the 24th inst. was \$25,050,753.

Morris Canal.--Inclined Planes.

By invitation of Wm. H. Talcott, Esq., who has been the Engineer and superintendent of the Morris Canal, since 1846, we have recently visited the Newark inclined plane, where the navigation of this canal encounters the first elevation in passing from the Hudson to the Delaware. The time of our visit was favorable for a full view of the machinery in active operation, and we improved the opportunity so afforded by gathering such facts and general knowledge relative to the history and construction of the work as the time to which we were limited would allow. As the working of the Morris canal illustrates a new feature in artificial navigation, one of which our engineering literature affords no just description, we propose to lay these facts before our readers.

The system of overcoming the rise and fall of water routes by inclines, instead of locks, was first demonstrated on the Morris canal, in New Jersey, and the results which have followed may justly allow this system to be regarded as a great improvement over the tedious and expensive mode for which it was substituted. The Morris canal, running from Jersey city, opposite New York, to Easton, Pa., 102 miles, overcomes an ascent of 914 feet, the total rise and fall being 1674 feet. This is accomplished by the aid of twenty-three locks, and twenty-three inclined planes, the latter of which are, in some cases, 1600 feet long, and 100 feet in height. The Newark plane is 1200 feet long, and 70 feet in height. The tonnage of the canal consists principally of coal, iron and iron ore, and will amount for the present year to 450,000 tons. The boats used are of an average of sixty tons each, the heaviest passed this season being of seventy-two tons, while the capacity of all the new inclines is one hundred tons. By projected enlargements the canal will accommodate an annual business of one million tons.

The object of this work was to open the Lehigh coal region to the New York market by a navigation connecting with the Lehigh canal at Easton. To do this, however, it was necessary to surmount the great elevation of the intervening country as there were no water courses affording an available opening through it. The project was commenced in July, 1825, by a Co. with a capital of \$4,100,000. In Aug. 1831, the canal was completed from Newark to the Delaware river, opposite Easton, 90 miles. In January, 1828, the company were authorised to extend their canal to Jersey city, its present eastern terminus. The capacity of the canal did not allow it to compete successfully with the Delaware division of the Pennsylvania canal, carrying coal also to tide-water, and for the attainment of this purpose the lift locks were enlarged in 1840 and '41. Immediately after this improvement the company failed, and their property, held by receivers, was rented for a small sum until 1844. At this time the whole work was sold to the present company for \$1,000,000. In the winter of 1848 and '49, the purchasers received authority from the State of New Jersey to issue a preferred stock of which about \$700,000 have been issued. In addition the company sustain a bonded debt of \$400,000, making their present capital about \$2,100,000, an amount far less than the sum expended on their work.

The proper value and efficiency of the Morris Canal could not be realized by the common system of lockage over such an elevation as existed

on its route. The delay attending such frequent and heavy lifts would seriously interfere with the navigation, while the cost of locks and the water required to operate them, were beyond the resources of the company, and of the reservoirs, respectively to supply. The only obvious method, therefore, of rendering the improvement available, was in the use of inclines, and engineers of the highest standing, including those in the service of the United States government, (General Bernard and Col. Totten among the number,) were appointed to determine their practicability. But, unfortunately, although a plan upon this principle had been devised, affording some advantage over locks of equal lift, there was none which could give the desired capacity to the canal. Some time in 1844, or '45 the system was again attempted, but without those results upon which the great object of the work depended. The present plan for operating the inclined planes was first proposed, in 1847, conjointly by the present engineer, and A. Whitney, Esq., of Philadelphia, who was at that time president of the company. In five months from the time authority was given to construct such a plane the whole plan was perfected, the machinery made, the plane rebuilt and put in successful operation, and all done without materially interfering with the use of the old plane.

The first trial of the new plane, (known as No. 6 west of the summit, and 18 miles from Easton,) was made January 27th, 1848, when an entire boat, comprising both sections, and with a cargo weighing 70 tons, was passed up the plane, nine hundred feet in length, and fifty-one feet in height, in three minutes and a half! This plane cost, with the entire machinery for working it, \$27,168, and superseded the use of six locks, which would have cost \$20,000 each, or \$120,000 in all, and would occupy one and a half hour's time. The amount of water required for operating the incline did not exceed one half that required for locks, a matter of importance where the supply of water is depended on reservoirs.

Here was a result which gave vitality to the institution. The course of the traffic was not disturbed as no stoppage was required in entering or leaving the incline, while the rate of motion throughout exceeded four miles per hour. By one stroke this canal, intersecting the loftiest ridges, overcome by any work of similar character, was placed upon a nearly equal footing with a level water route, working under no disadvantage excepting the interest and slight repairs upon the machinery.

The success of this plane determined the general adoption of the system throughout the line. In 1850 ten planes were built and at the present time thirteen out of the twenty-three planes are of this improved construction.

The machinery and operation of the planes is particularly simple and efficient. A wide double track connects the two levels, extending below the surface at the lower level, and by a summit and an opposite incline below the surface also of the upper level. At either end the boats are floated on to trucks resting upon the rails at the bottom of the canal. These are drawn out and up the planes by wire ropes, the power being a reaction water wheel placed as near the head of the incline as will allow of a sufficient fall of water.

The double tracks are of twelve feet gauge, the incline being generally one foot in eleven. The rails are three inches broad, but of only moderate depth, as they are supported on continuous timber bearings resting on solid stone masonry. They weigh 76 pounds per yard. The trucks are strong frames with high stanchions—the latter to hold the hawsers which confine the boats. As all the boats on the Lehigh canal are made in two sections (it being found that boats so divided are more durable, and easier loaded and unloaded, and require less timber to obtain equal stiffness,) the trucks are also made in two independent divisions, connected by shackles. This assists the boat in passing from the top of the incline, over into the upper level, as at this place there is a summit and an opposite incline to reach the bottom of the canal. This incline is of 1 in 20, and descends some five or six feet to the bottom. The trucks are carried on sixteen wheels each, all of which are controlled by brakes by which the whole load may be held at any point on the plane, even if detached from the rope. The friction of the wheels, when firmly held on a dry rail would be full one-seventh of the weight, while the power of gravity is but one-eleventh. The ropes are of wire, are 2 9-16 inches diameter and weight nine pounds per foot. One rope at the Newark plane is of English manufacture and contains 36 wires of one-fourth inch diameter each. All the other wire ropes in use on the canal were made by John A. Roebling, of Trenton, New Jersey, and although of the same diameter as the English rope, contain 343 wires. The ropes lie in the centers of the tracks, and at the upper end of the incline pass around horizontal sheave wheels, which are held strongly enough to resist the entire draught of the water wheel. The ropes are then brought down and secured to a cylindrical drum of twelve feet diameter, operated by the water wheel. This drum has a continuous spiral groove of three inches pitch around its outside, the length being regulated by the length of the rope to be wound up, or in other words the length of the plane. The ropes are fastened on opposite ends and on opposite sides of the drum, so that one is wound as the other is unwound, the motion of the drum being reversible by a clutch on the jack shaft of the water wheel, so as to work either up or down the plane without the friction and strain of an endless rope. The two outer ends of the two ropes are however, connected by a smaller rope which draws the boat out of the upper level on to the top of the incline.

The drums are worthy of notice. The rims, being of twelve feet diameter, and in some cases ten or twelve feet long, were cast in single pieces in dry loam. The spiral groove on the outer face was produced in the mould, a smooth circle equal to the diameter of the rim at the bottom of the groove being first "swept out," and a cutter or shaper, carried on a stiff arm secured to a large revolving nut and fixed screw of proper pitch being afterwards carried around until the proper groove was formed upon the whole face of the rim. Five of these drums with their arms and shafts were made at Paterson, N. J.; two at Rockaway, N. J.; and six at Philadelphia. The power is applied by a pinion, working just within the rim, and not through the central shaft whereby much torsion is prevented and the arms of the drum are much re-

duced in weight. The rim is stiffened in the outside, back of the internal spur teeth, by a deep flange.

The water wheel is of the kind known as the Scotch motor, or Whitlaw and Starrett's reaction wheel. It employs 55 feet of fall, yields 75 per cent of useful effect and is equal to four hundred horses' power. The high fall used is obtained by locating the wheel a good distance down the incline, and by digging a pit beneath, from which a level race emerges some two hundred feet nearer the lower level of the canal. The wheel has four curved arms of an extreme radius of six feet each, the diameter being twelve feet, and the orifices of escape are vertical parallelograms each fifteen and a half inches high, and three and a half inches wide. The discharge of water under a full head would be six thousand cubic feet per minute, during three minutes run on one ascent of an incline of seventy feet height. Not more than 3,500 cubic feet per minute are now used at the Newark plane. The whole wheel is under the control of a brake, combining the toggle joint and friction strap, by which a single man can bring the whole machinery to a stop under a full head of water. The gate wheel, the reversing lever for the main clutch, and the brake wheel are all under the hands of the operator, in an elevated tower, commanding full views of both levels.

The ease and efficiency of the operation of this machinery is wonderful. The boat coming along the lower level, enters between the stanchions of the submerged truck, fastens a single hawser, and without stopping its motion settles upon the truck as that is drawn out of the water; it continues up the plane at from four to five miles per hour, goes over the summit, the truck descending to the bottom of the canal,—the boat floating off by the impulse acquired,—the horses, who have been trotted up the hill, are again hitched on, and the boat is away upon another level! The wheel and rope have run smoothly and without jar, and in this simple operation sixty or seventy tons of cargo, exclusive of truck and boat, have been lifted seventy or a hundred feet, apparently without effort. This difference in the transfer of the navigation from level to level, is such that while good boatmen pass over the whole canal in five days, they would be compelled, if locked through all the rise and fall, to be out eight days,—a saving of sixty per cent in time. It is, as any one will perceive, a great merit of the incline that it occupies *no time*, in the sense in which we speak of a delay, as the boat goes *forward* as fast on the incline as on the levels, and is not detained in entering or leaving it. It is the *whole delay* of lockage that is saved, and not the *difference* between the time in ascending the locks and in ascending the plane. The boat is *elevated* and *advanced* by the same operation.

What must be the saving in the use of such a plan on the immense navigation of the Erie canal! The enlarged double locks at Lockport, costing some \$600,000 and occupying *two hours* in passing, might be superseded by this apparatus, built in the most substantial manner and costing not to exceed \$100,000, and operating, as we may well say, *in no time*.

At Little Falls it would effect an equal saving in cost and time. To what extent might the business of the Pennsylvania canal be increased if it

could be carried over the Alleghenies by this method. And the James River and Kanawha canal in Virginia, might also overcome its summit by this manner with the most advantageous results.

The same plan can be adapted to the heaviest tonnage of our lakes and of the ocean itself. A carriage, running upon a large number of tracks, would hold the vessel by a series of section frames fitted to the exact shape of its hull, while the latter was afloat, and the whole would be drawn up an incline say of one in twenty-five, for any required height. If the difference of level between lakes Erie and Ontario could be thrown into one plane in the ship canal around Niagara, the whole rise of 300 feet or more would be overcome in half an hour.

So far, the Morris canal furnishes the only application of this plan in America. In Scotland, however, a plane upon this general construction has been built and operated by *steam*, while the boats instead of being run on open trucks, are floated into "lock cradles" occupying their place. The following extract from a Glasgow paper shows the source from whence the improvement was derived.

Canal Locks Superseded.—On the Monkland canal at Blackhill Locks, the waste of water, time and labor, has been obviated by the substitution of a steep incline, with rails and water tight cradles into one of which latter the boat is floated, when it is drawn up with a wire rope, worked with drums, by the power of a steam engine, aided by the descending cradle filled with water. Thus, in five minutes, the half hour's work of eight locks costing hitherto £100 a day is done at comparatively little expense, and with a waste of no more than the water displaced by each boat, when floated into its cradle. Mr. Leslie, of Edinburgh, the engineer of Dundee harbor, has adopted this idea from American practice or experiment.

The Newark Inclined plane is within the city of Newark, N. J., not more than ten minutes' ride of the Market street station of the New Jersey railroad, and those who have never seen this triumph of engineering should avail themselves of the opportunity. The best time to visit it is on Monday morning, when the boats which collect on Sunday at Bloomfield, on the "17 mile level," are descending to tide water. The machinery however, is always open for inspection, and is in use for most of the time.

Journal of Railroad Law.

SUNBURY & ERIE RAILROAD SUBSCRIPTION.

The views of the Court in this case, as expressed below, are undoubtedly just. Until criminal courts are more successful in punishing full blown crimes, they had better not meddle with those which, at the worst, are only in the bud.

The Grand Jury of Philadelphia having desired to take some action to prevent the subscription by the county commissioners of \$2,000,000 to the Sunbury and Erie railroad, asked the opinion of the District Attorney as to their power in the premises. Mr. Reed replies in his opinion that the Grand Jury had better not take any immediate action. Judge Thompson who was appealed to, remarked that—

"The matter charged here is that the County Commissioners are about to do something contrary to law. This does not bring them within the province of a criminal court, which is a court of pun-

ishment and not of restraint, except in case of nuisance, etc. The offence must actually have been committed before it interferes. The fear of the Grand Jury is that an offence is about to be committed. It is for the Court to see that individuals innocent of crime are not harrassed or injured by any action of the Grand Jury.

"The County Commissioners believe that they have the right to subscribe to the stock of the Sunbury and Erie railroad, and desire to exercise that right. If they were to subscribe we could not interfere. A Civil Court might restrain them.

"The only way in which this Court could interfere would be where it could be shown that a bribe had been taken to procure the subscription.

"Nothing having been produced to show corruption or bribery in procuring this subscription, this Court cannot interfere. Until more evidence is produced to show bribery, a presentment ought not to be made against an individual or a corporation.

"He was not at all surprised that the attention of the Court and Jury had been brought to the matter of the subscription, and that the public mind had been excited upon this subject. If three men possess such power as is claimed by the county commissioners, it is a very dangerous power, and all of us may be made to suffer from it, if legislative interference is not called into requisition."

THE MAD RIVER AND LAKE ERIE RAILROAD CO.

This Company which constructed a new road from Tiffin to Sandusky, in alleged violation of good faith, towards the Bellevue people, were enjoined against using their new route, and subsequently by Judge Corwin, the injunction was dissolved. But Chief Justice Bartly lately at Cleveland annulled Judge Corwin's order, so that the company must forego the freedom which they for a brief period enjoyed,—and are compelled to suspend further action until the proceedings for contempt of court are concluded, and the final decision in their case has been rendered.

THE RIGHTS OF RAILROAD EMPLOYEES.

The decision of the Huntington County Common Pleas, in Pennsylvania, in the case of Mitchell vs. Pa. Railroad Co., illustrates the following two sound principles of law.

1st. That one employee has no right of action against the principal for an injury caused by the negligence of a fellow employee.

2d. That when a railroad company places in the hands of an employee, when he is employed, rules for his guidance, one of which is that "*the regular compensation must cover all risks in the company's service*," this becomes a part of his contract with the company, and bars all claims for injuries received in such service.

The plaintiff claimed damages for an injury sustained by a collision of a passenger and a freight train in 1851. He was long disabled in consequence of such injury, and will probably be so, to some extent, through life. The accident happened from the negligence of the conductor of the freight train and had plaintiff been a *passenger* his claim would have been sustained. But he was a baggage master, and that he has no legal right of action in this case, was, as the court considered apparent from the following authorities. *Priestly vs. Fowler & Mee, & W. J.* decided in 1837. *Farwell vs. the Boston & Worcester R. R. Co.* 4 Met. 49,

Story on contracts 4453. 70 En. Com. Law. 451. *Hutchinsons Executor vs. the York, Newcastle, & Branch R. R. Co.* 5 En. Rep. 344. *Strange vs. McCormick* 10 Am. Law Journal 398.

The Court observed that "every business has its risks, with which one engaging in it is supposed to be acquainted, and to undertake to construe otherwise a contract of this kind would often amount to a sort of insurance against the casualties of life."

"The principle is," says Baron Alderson, in *Hutchinson vs. the York & North Midland Railroad Co.*, "that a servant when he engages to serve a master, undertakes as between him and his master to run all the ordinary risks of the service, and this includes the risk of negligence on the part of a fellow servant, acting in the discharge of his duty as servant of their common master."

But moreover the plaintiff had the company's book of rules, by which his wages were to cover all risks. And these rules the court declared to constitute a contract between him and his employers. This ruling is in accordance with *Austin vs. the Manchester Railroad Co.*, 70 Eng. Com. Law, 451.

The Mississippi and Ohio Rivers.

The Mississippi and Ohio rivers, containing plans for the protection of the delta from inundation; and investigations of the practicability and cost of improving the navigation of the Ohio and other rivers by means of reservoirs; with an appendix on the bars at the mouths of the Mississippi. By Charles Ellet, jr., civil engineer. Philadelphia, Lippencott, Grambo & Co. 1853.

The Memoir on the Mississippi river was originally presented in a report to the War Department and published in the Executive documents of the Senate. It bears evidence of a close study of the physical constitution of the delta and of the causes that have given it its present extent and character. The habits of the river, its reception and discharge of water, including all the particulars of its width, depth, inclination and velocity, currents, overflows, and the solid material which it is carrying down to the ocean, are all exhibited.

The object of the work is fully indicated in the title. The physical constitution of the delta and the habits of the river are first described. The delta, of uniform southern slope, 500 miles in length and 40,000 square miles in extent, having been formed by the matter brought down by the river from the country in which it has its source, is shown to be continually extending into the sea, diminishing in slope and increasing in depth. The process by which it has been deposited has diffused it over a width of from 75 to 150 miles and the level of this surface being necessarily nearly the same as that of the stream which has formed it, and which has raised its own bed upon it, a large extent of country is exposed to overflow upon every considerable rise of the water. The inundated lands are the natural reservoirs which receive the surplus which the channel of the river, in such stages of water, is insufficient to discharge. The exclusion of the water from these lands by means of levees, and by the drainage and cultivation attending their reclamation, throws upon the river the task of bearing this surplus, in addition to its usual flow. The effect of the natural reservation of water is strongly presented by showing conclusively, that, even with the present extent of

levees, an amount of water, greater than that supplied by the Ohio and all the tributaries south of it, is absorbed by the swamps on the sides of the Mississippi and is never discharged at its mouth. The volume of water discharged per second at Cape Girardeau, above the confluence of the Ohio is greater than that which flows past New Orleans. Nor by throwing the amount now lost in the swamps into the channel of the river will the increased current abrade a passage of sufficient dimensions for its discharge, as the experience with the different "cut-offs" has demonstrated. The Racourci cut-off, now open for three years and with the advantage of an increased current owing to passing through a given descent of the river in a less distance, has not yet gained the average cross section of the river above or below. And the effect of "cut-offs" is to assist in inundating the country below, as by increasing the inclination of the stream at the points where they are made a larger discharge is thrown upon the channel below, while the capacity of the channel to discharge the increased burden is no greater than before.

The overflows are yearly increasing upon the country of the lower Mississippi, and it has become an object of the most important character, one which is sought both by individual enterprise and by state legislation, to avert their destructive effects.

Mr. Ellet's plans propose, as a temporary relief, the extension of the levees and an increase of their strength, and as a collateral protection the prohibition of any future cut-offs. He also proposes the formation of a new channel for the river into the head of Lake Borgne, which is in effect to shorten the delta, increase the inclination of the river surface, and thereby produce greater discharge. The enlargement of the Bayou Plaquemine and of the channel of the Atchafalaya is also urged as a relief to the part of the coast most exposed and for effecting a separate discharge of the Red River and the Washita.

But Mr. Ellet's principle plan, which he has urged upon a conviction of its affording the only certain and permanent relief for the protection of the delta, and at the same time of improving the navigation of the Mississippi, is the equalization of the waters by the construction of artificial reservoirs upon the tributaries, in which the water may be retained in time of freshets and from which a discharge may be maintained in times of drought. As the freshets of these rivers are not simultaneous at all points, but each may be said to resemble a wave flowing along the channel, and as these freshets originate in the tributaries, which first receive the thaws and drainage of the mountain slopes, it seems clear that on these tributaries there can be artificial means of controlling any rise or fall of water. Many of these smaller tributaries being little used for navigation, and traversing wide valleys, often nearly barred across by hills where the outlet of the stream is found, might be made, by aid of suitable dams, to throw back an immense volume of water, capable of controlling the navigation at least, and if sufficiently numerous and properly distributed, the freshets also.

The Memoir upon the Ohio, now published for the first time, contains a special investigation of the practicability of controlling the navigation of

that river by means of reservoirs. That it can be accomplished Mr. Ellet's work seems sufficient to prove, and surveys should at least be made with a view of adopting this plan. Whether accomplished in our own times or in the future, the plan will not lose its prerogative of boldness and beauty.

To Mr. Ellet, we believe, belongs the great credit of suggesting this scheme of public improvement in its great application to the discharge of the mighty rivers of the West. He has sought for facts and has observed results, has made the circumstances and conditions of these rivers a study, as his memoir fully proves, and altogether has produced the most startling and fertile contribution to physical science that has appeared within recent times. His work commands the attention of all immediately or remotely interested in the future progress of the great Mississippi valley.

Finances of Tennessee.

Gov. Campbell of Tennessee, sent in his annual message to the Legislature of that State on the 8th inst. We extract a portion of the document relating to the State finances, intercommunication and banking.

"The receipts derived from all sources for the two years terminating on the 1st of October, 1853, were \$1,202,046 30, while the expenditure for the same period amounted to \$1,218,887 28, showing an expenditure greater than the receipts.

"The total value of the taxable property of the State reported to the Controller, as assessed by the Revenue Commissioners for the year 1852, is stated to be \$186,620,119, exhibiting an average value of land at \$3 84 per acre, and of slaves at \$547 25.

"To meet the liabilities of the State of every description, including existing and accruing charges, in addition to the balance now on hand in the Treasury, amounting to the sum of \$206,431 86, the means and source of revenue belonging to the State are, in the Bank of Tennessee, \$1,000,000 of stock, and \$1,353,209 55 of the surplus revenue, deposited by the United States Government with the State, which may be properly regarded as means of the State, and \$625,600 of Stock in the Union Bank. Each of these Banks pays semi-annual dividends of about 4 per cent. and the stock of each is regarded as at par value.

"Beside Bank stock, the State owns stock in Turnpike Companies, and in the East Tennessee and Georgia Railroad Company to the amount of \$2,028,856 66. Several of these pay dividends.

"As a further support to the public credit, it should be stated, that for the whole amount advanced by the State in the way of loans in bonds of the State issued to Railroad Companies, or by endorsement of the bonds of the Companies, amounting altogether to the sum of \$1,945,000 and constituting a large portion of the whole amount of the public liabilities, ample indemnity and security are provided by mortgages upon the entire roads and property of the respective companies.

"The public debt, exclusive of current charges, and the evidences of which consist of bonds issued by authority of the State, and bonds indorsed by the State, of certain companies, amounts to \$5,746,856 66. These bonds were issued, bearing various rates of interest, that is to say, five and one-fourth per cent. internal improvement bonds, amounting to \$213,416 66; five per cent. bonds issued on same account \$1,838 440; six per cent. bonds issued to the Bank of Tennessee, \$1,000,000; five per cent. bonds issued to the Union Bank, \$250,000; being \$125,000 less than the last statement—this last amount having been redeemed by payment since the last session of the Legislature, six per cent. bonds issued for building the Capitol, \$600,000; six per cent. bonds is

sued under the act of 1849—50, and under acts of the last Legislature, and loaned to various rail and plank-road companies, \$1,095,000; six per cent. bonds of the Nashville and Chattanooga Railroad Company, indorsed by the State, \$850,000. It is proper to state, that of the above amount of bonds, there have been issued since the last session of the Legislature to the Memphis and Charleston Railroad Company, under the act of the 11th February, 1852, \$400,000; to the plank road company from Dyersburg to the Mississippi River, \$25,000; to the East Tennessee and Virginia Railroad Company, under the act of the 15th January, 1852, to aid in the construction of bridges on the road, \$300,000; to the East Tennessee and Georgia Railroad Company, under the acts of the 4th and 26th February, 1852, to aid in the completion of the road, \$20,000; for completing the State Capitol, \$250,000; and that the bonds of the Nashville and Chattanooga Railroad Company, within the same period, have been indorsed, under the act of 1847-8, to the amount of \$250,000—an equal amount having been indorsed by my predecessor, under the same act. Bonds of the company have been indorsed under the act of the last session of the Legislature to the amount of \$350,000.

The following Banks upon the free banking principle are now in operation: The Exchange Bank of Murfreesborough, with a capital in bonds fled with the Comptroller, as directed by law, of \$89,583; the Bank of Knoxville, with a capital of \$50,000; the Bank of Nashville, with a capital of \$70,000; and the Bank of Memphis, with a capital of \$50,000."

Railway Bridge at Niagara.

This great work, which is to unite the United States with Canada by a railway, is rapidly advancing under the supervision of Mr. John A. Roebling, an engineer favorably known in connection with the suspension aqueduct on the Pennsylvania Canal, at Pittsburgh, and a suspension bridge over the Monongahela, near the same place. As it is to be on some accounts one of the most remarkable mechanical achievements in the world, we shall be pardoned for devoting considerable space to a careful description of its plan and prospects. It is well known that Stephenson, the Magnus Apollo in engineering, whose fame rests upon his Tubular Bridge over Menai Straits, has decided against the suspension principle as applied to railway bridges, mainly on the ground that it is incapable of rendering them sufficiently stiff. The successful construction of this work, therefore, at Niagara, will make an era in bridge building. It will be doing what has not merely never been done before, but what has been pronounced by the highest authority impracticable.

The present suspension bridge, having been constructed in 1847 to aid in the erection of the railway bridge, will be removed after performing that service. It was begun by a boy on the Canada shore, who elevated a kite, and by that means established a thread communication with the other side. Over this tow-path wire was drawn, and the wire cables were soon formed.

The railway bridge will consist of two parts, each suspended from two cables; a covered one for common travel, and above that, on its roof, an open track for the railroad. It was first intended to build a bridge with a single floor, but the difficulty of rendering it wide enough for purposes of horse, foot and steam locomotion at the same time, without making it too heavy and too expensive, caused the plan to be abandoned. The double floor of this bridge simplifies the problem of rendering a stiff support to the weight of a railroad train, by placing under it, in addition to other props, the trusses that will form the sides of the lower portion of the bridge. The hollow tube, also, which that part will form, is expected to aid materially in strengthening the work, operating like the tube in Stephenson's bridges.

The bridge will be 800 feet long, hung by wire ropes, five feet apart, to four huge wire cables, stretching from shore to shore with a considerable

deflection, over the tops of towers 60 feet high. The towers are now far advanced towards completion, having been begun some four or five months since. They are 15 feet square at the base and 8 square at the top, built of a dark-colored limestone, very hard and compact. But the first operation which was commenced last winter, was to sink eight shafts, 25 feet deep, in the rock below the towers, four on each side of the river. In the bottom of each of these, enlarged for the purpose, a cast-iron plate, six feet square, was placed, to which an immense chain was fastened. The shaft was then filled in with masonry, the chain being imbedded in a mixture of cement, lime and sand. These chains reach the surface, outside the base of the towers, and are to connect with the cables. They will be 66 feet long, each consisting of eight links, that average over eight feet in length. The links are made alternately of seven and eight plates of wrought iron, each plate formed into one piece without a weld. Each link of eight plates has *sandwiched in*, to use an expressive phrase, the plates of the sevenfold link, and the whole fifteen are riveted firmly together by an iron bolt, 3½ in. in diameter. The anchor plate at the bottom of the shaft cannot be lifted until the whole rock is raised bodily, with all its incumbent masonry. Nor can the plates and chains give way from any force which can be withstood by the cables, and they are calculated to withstand a pressure four times greater than the whole weight of the superstructure, combined with any load that will ever be placed upon it.—The towers, it will be observed, act as fulcrums between the chains on the one side and the cables on the other, and the weight of a loaded bridge will not act upon them sideways, but vertically.

The cables are to be 9½ inches in diameter, each formed of 3,390 strands of wire. Long lines of wire are first formed, by fitting the ends of separate pieces to one another and wrapping them round with smaller wire. These are then dipped in boiling oil and dried, and the process is repeated a number of times, until a coating is formed that will protect the metal thoroughly from the moisture. The wire is then wound round large cylinders. These operations are now going on upon the Canada shore. When the cable comes to be formed, the wire will be drawn over to the American side, one strand at a time, passed through the link of a chain, then drawn back to the other side, passed through a chain there, and so on back and forth, until the whole cable is made up; this will then be tightly wound round with a small wire. The cables will connect with the chains, after passing through iron saddles on the top of the towers, these being iron blocks with a groove in them fitted to the cable. Each saddle rests upon a wrought iron roller, three inches in diameter, that rolls on a smooth iron plate. This is to accommodate any slight motion that may arise from unequal tension between the chains and the cables, when the balance is from any cause disturbed.

Stephenson's great objection to the suspension principle, as was stated above, was the want of stiffness. It is conceded by the engineer of this bridge, in his report on the subject, that wire cables will not be sufficient. But he relies for stiffness, first, upon the timbers placed under the railway. Two girders, as they are called, or longitudinal timbers, four feet deep, are to be placed in the upper floor, for the immediate support of the track. In addition to these, are the trusses or sides of the lower bridge, which will consist of upright posts five feet apart, supporting the upper floor, and connected with one another by a light bridging and by iron rods. Any pressure upon either floor is thus shared with the other. These rods are to be one inch in diameter, and from two to three feet long, and will connect the posts by fives crossing at right angles, between the top and bottom of the first and fifth. The vertical action of each post is by these means transferred to each of those with which it is connected. The rods will have a nut at each end, which will be screwed up tight to the post, so that these rods

will make the trusses extremely rigid. Besides these two sources of stiffness, stays will be made use of, that is, iron rods reaching out from the towers to the bridge at different angles, like those sometimes employed to sustain a long and heavy gate. These three resources, it is believed, will supply to the bridge all needed stiffness.

The action of the wind will not be very great, the trussing of the lower bridge being quite open and allowing it a free passage. The width of the lower part will be nineteen feet clear of the upper twenty-four feet, the latter being elevated twenty feet above the other floor, and 230 above the water. As to the capacity of the bridge—supposing it covered from end to end with a loaded train, the weight of such a train is estimated at 430 tons, which added to the weight of the bridges, 7½ tons, and fifteen per cent, on the weight of the train, as the result of a speed of five miles per hour, viz: sixty one tons, make 1,274 tons. The tension of the cables resulting from this and their average deflection, is equal to 2,240 tons. Their capacity is 10,000, or more than four times that tension. The tension referred to, it will be observed, is an extraordinary one, as it can scarcely be supposed that a loaded train equal in length to that of the bridge, will ever be allowed upon it.—Assuming, as the engineer does, 2,000 tons as a tension to which the cables may more frequently be subjected, he has provided a resistance equal to five times that. The covered floor, were it crowded to its utmost capacity, might hold 310 tons.—But as this might be closed in case of a very heavy train approaching, before it was allowed to come upon the bridge, it is not necessary to make a calculation for an extreme load upon both parts at once.

The suspension bridge at Lewiston is 1,040 feet in length, the largest in the world. This will be 240 feet shorter, but a far more surprising work.—It is to be done next June. Its cost was estimated at \$250,000, but it is likely, we are told, to exceed that amount. Supposing it is twice as much, what a saving even then, in comparison with the immense expenditure to which Stephenson has subjected the English at Menai Straits and Montreal. The tubular bridge at Montreal is not yet done or paid for, to be sure, but its cost is estimated at \$7,000,000.

Virginia and Tennessee Railroad.

The sixth annual meeting of this company was held at Lynchburg on Wednesday, Oct. 26th, at which time the President, John R. McDaniel, submitted his annual report, giving the following exhibit of the affairs and prospects of the company for the year ending September 30th 1853.

During the year and as soon as practicable after the adjournment of the last meeting a mortgage on the whole road and equipment was executed as security for bonds then authorized to be issued. Of these latter \$500,000, convertible into stock, are held for payments upon monthly estimates to contractors, an agreement having been made for that purpose. \$1,000,000 of these bonds are to be cancelled and an equal amount, represented by a State loan, will be substituted in their place.

A sufficient amount of iron was purchased in the month of December, 1852, and in the early part of 1853, the prices being favorable for the company. The price of the last purchase of 13,000 tons was \$71 81, delivered in Lynchburg, a rate below the calculations of many.

No dividend has been declared out of the surplus earnings of the road.

A survey has been made for a branch from Abingdon to the Cumberland Gap, which the engineer reports as 135 miles in length, the distance between Abingdon to the North Fork of Holston, 15 miles, being \$33,000 per mile, the remaining distance at \$17,650 per mile, and the whole line

costing \$2,613,061. This estimate is believed to be full both in regard to distance and cost. Seventy feet grades are contemplated by the survey. The estimate includes only so much of the Tunnel in Cumberland Gap as lies in Virginia, leaving the remaining portion to be built by Kentucky.

A survey of a branch to the Salt Works in Washington and Smythe Counties gives a distance of seven and a half miles at a cost of \$140,000 for construction. The annual product of the Salt Works is 445,000 bushels.

The payments and subscriptions of stock have been as follows:

There was unpaid on Oct. 1st, 1852,	
on individual subscriptions.....	\$173,997 59
On State account.....	247,000 00
	<hr/> 421,997 59

During the last year there	
has been subscribed of	
new stock by individuals. \$	92,300
By State.....	170,800
	<hr/> 263,100 00
	<hr/> \$385,097 59

Of this there has been	
collected from indi-	
viduals.....	199,798 92
State.....	332,200 00
	<hr/> 531,798 92

Leaving now due and unpaid	153,298 67
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of which \$66,508 67 is due from individuals, and \$86,800 from the State, showing the collections to have been (5-6) five sixths of the entire amount outstanding at commencement of the year, including subscriptions since.

On 1st Oct. 1852, there was unsubscribed, of the original amount authorized by the charter, by individuals \$162,700. There has been taken since, as shown above, \$92,300 which leaves unsubscribed by them \$70,400.

Seven engines have been contracted for during the year, fourteen of which at \$7,650; one at \$7,500; one at \$8,000, and one at \$9,000.

From the tabular statement of the freight ticket and disbursing agent, the following exhibit of the earnings of the road is made:

The gross receipts from all sources	
are.....	\$109,267 57
From which deduct expenses.....	66,531 26
	<hr/> \$42,736 31

The average length of road in operation the past year was 58 miles, and putting the cost thereof \$1,242,209 20, which is the proper proportion, gives a net profit of 3 44-100 per cent.

The tonnage of material used in construction, estimated at \$4,000, forms no part of the above estimate, and is here stated only to show the full work of the road.

The president recommends the application of the surplus profits to a contingent fund for the payment of interest on the company's loans.

The annual statement of the treasurer, showing the condition of the finances of the company, is submitted, and presents the receipts and disbursements for the year, as also the receipts and expenditures from the organization of the company to same time (30 Sept. 1853.) The aggregate receipts from all sources, (including balance on hand at the commencement) were \$1,519,061 44, and the disbursements \$1,844,844 79, leaving a balance on hand of \$146,286 11—consisting of \$92,

850 61, in cash, and \$53,400 in Washington and Smythe County Bonds.

The receipts from the organization of the company have been \$3,794,150 69, and the expenditures \$3,847,864 58.

There has been a sale of \$10,000 of the Washington county bonds, and the money in payment thereof, is in the hands of the treasurer.

No sinking fund is required to be held for the redemption of the loan by the state; but instead thereof, the payment semi-annually of 3½ per cent. which pays the interest on said loan and in 34 years cancels the debt.

The means on hand for future operations are as follows.

Cash on hand, per report.....	\$146,286 11
Amount due from private stock-	
holders.....	66,508 67
Amount due from State on account	
Stock.....	86,800 00
Amount due on State Loan.....	385,000 00
Amount of Bond on hand.....	406,000 00
Amount due by Bills receivable.....	34,282 39
	<hr/> \$1,124,877 17

To amount due individ-	
uals.....	\$24,214 69
Amount due by negotia-	
ble notes.....	125,247 89
Amount due Stockhold-	
ers.....	383 00
Amount due Contractors	14,450 20
	<hr/> 164,295 78

Shows a balance.....	\$960,581 39
Add amount of Stock to	
be taken by Individ-	
uals.....	\$70,400 00
Which will draw from	
the State.....	105,600 00
	<hr/> 176,000 00

Makes an aggregate of.....\$1,136,581 39

In the above estimate the State's subscription as put down is \$20,600 less than its proportion of the Capital Stock, as there are about \$13,744 of the private Stock subscribed believed to be insolvent; which, however, when a sale and transfer shall be made to some extent, and a corresponding proportion from the State, will be rendered available. The wants of the Company to complete and put into operation the entire work may be put down as follows:

Iron unpaid for to 1st Oct.....	\$581,639 28
Engineer's estimate for Graduation	
and Masonry.....	359,827 00
do. do. Superstructure and	
Bridges.....	121,000 00
do. do. Locomotives.....	120,000 00
do. do. Rolling Stock.....	134,000 00
	<hr/> \$1,316,466 28

No estimate is here made for interest, as no doubt, is entertained of the revenue from the road in operation being ample to pay running expenses and the interest on loans. The estimate of the receipts for the present year is \$200,000.

By the accompanying report of the Engineer, Charles F. M. Garnett, Esq., we learn that it is expected to have the road in operation to Christiansburg by Christmas.

Beyond that point there is comparatively little heavy work, and nothing can occur to delay the regular progress of the track.

The road bed is ready to receive the rails as far as New River, with the exception of one section near the River, which will be completed by the end of the year.

The New River bridge is in rapid progress, and will be completed before the rails can reach it.—The whole amount of graduation and masonry, which remained to be done West of New River, on the 1st day of October 1853, was less than \$275,000, so that there is now nothing beyond Christiansburg in the way of the superstructure.

The track will hereafter be laid as rapidly as it can be done with due regard to the faithful execution of the work; and it is confidently hoped that it will reach Abingdon, and perhaps the Tennessee line, by the end of 1854.

The Virginia and Tennessee road was opened to Salem on the 15th of December last, and to Big Spring, about 73 miles from Lynchburg on the 10th of August last.

The President of the Company for the ensuing year is John R. McDaniell, and the Directors chosen at the meeting of the stockholders were Henry Davis of Lynchburg and George Stuart of Wythe.

Norfolk and Petersburg Railroad.

It will be seen by reference to our advertising pages that proposals for work on this line are solicited. Of the character of the work to be let the Norfolk Herald remarks as follows:

We were favored a few days ago with a view of the new line, as projected on the Map and cannot express ourselves in terms more favorable than it deserves. From the starting point near Norfolk city there are but two curves in the whole length of the road for seventy-five miles, viz: one near Gilmerton and one near Suffolk. From the Southern Branch of Elizabeth River to Suffolk there is a straight line for 16 miles, then with an easy curve to get a proper direction for Petersburg the road runs in a Bee line 54 miles!—avoiding a vast number of mill ponds, creeks, &c., that abound in that country, and crossing the main water courses at points, than which, more eligible cannot be found on these streams. These are advantages which will tell in the working of the road, since besides straight lines, the grades are no heavier than would be necessary to the proper drainage of the road. If there is any railway in the country where lines equal to those obtained here are to be found, we are yet to hear of it, and when we take into consideration that this line of 54 miles straight out! has been established on ground in every respect the most eligible for the road, we must consider it as a signal achievement in railroad history. The avoiding of difficult crossings will greatly contribute to the economical and speedy constructions of the work.

From the 1st of August to the 28th of September, a period of eight weeks, 75 miles of the line were established, and 115 surveyed in connection with it. When we bear in mind the nature of the country traversed, the dense forests and undergrowth, the hot sun, alternated with drenching rains which prevailed in August, and the thousand pests which beset our wooded low lands in midsummer, we feel bound to award our meed of praise for the energy and industry evinced on the occasion. There was, too, but one division of Engineers, divided in two parties for a time only, that performed this task. Not waiting for Assistants, which it was difficult to obtain, owing to the demand throughout the country, the Principal took the field in person and pushed on with untiring diligence till his work was completed, and deserves the confidence of every true friend of the road. There has been not a moment unemployed—what has been done, was absolutely necessary to the proper location of the road and we congratulate our citizens on the auspicious commencement of this important undertaking.

Two parties of engineers in charge of Jno A. Hayden and J. M. St. John, Asst. Engineers of this road are engaged in the location of the line, sixty

two miles of which will be permanently fixed before the first of December, and the remaining seventeen miles to Petersburg as soon thereafter as practicable. This line, which is in charge of W. MAHONE Esqr., Chief Engineer will be composed of very easy work for the section of country through which it is to pass, and is every way worthy the attention of Contractors, in quest of jobs.

Evansville and Crawfordsville Railroad of Indiana.

The election of officers of this company, made on the 10th ult., was as follows:

Hon. Samuel Hall, president, John E. Martin, secretary, W. J. Ball, chief engineer. By a resolution of the board of directors it was decided to separate the road into three divisions:—The first division to extend from Evansville to Vincennes; the second from Vincennes to Terre Haute, and the third from Terre Haute to Crawfordsville, or as far north as the road shall be from time to time put under construction.

The portion of the road between Terre Haute and Rockville, was also ordered to be placed under immediate contract for construction.

W. D. Griswold, Esq., of Terre Haute, was unanimously appointed superintendent of the Second Division, and Maj. A. M. Puett, of Rockville superintendent of the third division.

East Tennessee and Georgia Railroad.

Thos. H. Callaway, Esq., former President of the East Tennessee and Georgia Railroad resigned that office in September last, and Mr. C. Wallace of Knoxville was elected to fill the vacancy. Mr. Callaway has filled the office of President of the road for about two years during which time he had conducted the affairs of the company with much efficiency and greatly to the satisfaction of the stockholders; who were anxious to retain his services, but his private affairs being of an engrossing nature demanded his whole attention, and caused his resignation. The well known character of Mr. Wallace, as an energetic business man is an earnest, that the efficient policy of Mr. Callaway will be carried out, and that the stockholders and community will not suffer by the change.

This road has been in operation to Loudon, 82 miles, for about one year, and is now being pushed forward to Knoxville, with great energy. The construction of the bridge over the Tennessee River will cause some delay in that extension. The contract of Messrs. Galtys & Co., for this work has, by mutual agreement of the parties been annulled;—masonry has been relet to Messrs. Seward & Hobart, the efficient contractors for the bridge of the Memphis and Charleston road over the same river at Decatur and to Mr. Geo. Salpaw well known upon southern roads as an energetic and experienced builder. Messrs. Maxwell, Brigg & Co have the superintendence. These contracts will ensure the completion of the bridge early next summer.

Mr. Wallace with Mr. Prichard the engineer of the road have recently closed a contract in this city on very favorable terms with Messrs. Raymond and Fullerton for the iron rails necessary for the completion of the road to Knoxville, to be delivered early in the spring. This will enable the contractors for the track to complete the road, by the time the bridge is finished,—and the entire road to Knoxville will be opened by the 1st of September next.—Above Knoxville the East Ten-

nessee and Virginia road is progressing, with great energy, and it is expected that 30 miles will be ready for the rails as soon as the lower road can deliver them at Knoxville. The remaining portion of this road is in a state of forwardness sufficient to warrant the assertion that the whole track will be laid continuously from Knoxville without any delay, and will be completed by the 1st September 1855 to the State line of Virginia. By this time the Virginia and Tennessee road from Lynchburg will have reached the same point. This will complete the great inland air line railroad from New York to New Orleans. It is gratifying to learn that the different companies forming this line are in excellent financial position and will be able to push on their works in spite of all present or prospective stringency in the money market.

The New Albany and Salem Railroad commenced running regular trains the 3d ult. from Michigan City, 130 miles south to Crawfordsville, through Lafayette; and the company expected to run ten miles farther by the 10th of October, to Bainbridge. On the south end of the road, regular trains are now running 91 miles, and it is expected in a few days they will run to Bloomington, 96 miles from New Albany; that leaves 51 miles still to be laid with iron, which will be done, it is said, within the year, as the grading and bridging are on a good state of forwardness, with the iron on hand.

Tanner's Double-acting Brake.

It will be seen by the terms of settlement, advertised in this number of the Journal, between the patentee and the Hudson River railroad company, that that company have acknowledged the right of Mr. Tanner to the brakes now in use on their road, and paid him for the same. We understand that this company, in common with many others, had purchased the right to use the brake from other parties, whose right to sell it, they are now satisfied, was not good. We mention this fact for the purpose of calling the attention of those companies, who may be placed in a like position, to their liability to Mr. Tanner.

Texas.

The Harrisburgh (Texas) Recorder says there were sixteen wagons at the Harrisburg railroad depot on Sunday before last waiting for loads of freight, and many more on their way from Columbus and Wharton.

We learn from the same paper that the subscription books of the Houston Railroad Company were publicly burned at a meeting at Chappell Hill; so that project is probably given up, for the present, at least.

The subscriptions to the stock of the Harrisburgh road continue with much enthusiasm, Gen. McLeon is said to be using his eloquence in its favor with the best effect. The people have no doubt wisely concluded to finish one road instead of commencing several rival ones with a chance of all resulting in failure.

New Albany and Sandusky City Railroad.

The following gentlemen were elected Directors of the New Albany and Sandusky City Junction railroad company, to serve for one year, to-wit: John S. Davis, Thomas L. Smith, James Montgomery, P. M. Kent, V. A. Pepin, J. B. Winsandley, J. S. McDonald, J. C. Moodey, W. M. Weir, John Evans, Nathaniel Moore, E. R. Day, and J. A. Moffett.

John S. Davis, Esq., was re-elected President, and T. L. Smith, Secretary.

Baltimore and Ohio Railroad.

The election for Directors at the recent annual election resulted in the choice of the following Board: Thomas Winans, Chauncey Brooks, Chas. M. Keyser, W. H. Keighler, Nathan Tyson, Thos. Swann, Columbus O'Donnell, John Hopkins, John Donaldson, Benjamin DeFord, Fielding Lucas, Jr., A. Schumacher.

Memphis and Charleston Railroad.

The Superintendent of the western division of the Memphis and Charleston railroad writes—

"Our business is very good. We have brought in since the 1st day of this month 1499 bales of Cotton—averaging 300 bales per day. Our up freights and passenger receipts are very good, passengers averaging \$175 per day, up freights \$140. We expect to reach this month \$18,000. Our receipts for September were \$10,554.

President of the Va. Central Railroad.

The following gentlemen have been nominated by their respective friends as candidates for the office of President of the Virginia Central Railroad. Gen. A. A. Chapman, of Monroe; Kenton Harper, A. H. H. Stuart, Hugh W. Scheffey, of Augusta, and Col H. J. Randolph and S. W. Ficklin, of Albemarle. The election will be made at the annual meeting of the stockholders, the 10th of November.

At a meeting of the Board of Directors of the Virginia Central Railroad Company, held the 12th inst., a dividend of 10 per cent. was declared to the old stockholders, payable in the scrip of the Company.

Kasson's Locomotive Express.

William M. Kasson of Buffalo has made arrangements, in connection with his fast freight express, for transporting locomotives without delay over the different gauges of the western states, so as to avoid the delay and expense for changing drivers, fitting trucks and ponies, &c. Previous to his engaging in this enterprise the transportation of locomotives was wholly across the lake, by which heavy charges were incurred for forwarding, loading, freights and insurance. Besides, the lake navigation was very dangerous, fourteen locomotives, worth, at least, \$112,000 having been already lost in the lake during the rough weather of the spring and autumn months. The cost of transportation between Buffalo and Cleveland by the express, although embarrassed by two breaks of gauge, is less than the insurance during the most favorable months by the lake.

One hundred and fifty locomotives have already been carried through, while contracts are made for the delivery of over two hundred more previous to June 1st, 1854. The present arrangements have cost \$20,000, while an equal sum will still be required to complete them. There has been spent \$14,000 for cars suitable for the purpose, most of which have been made in Cleveland.

The cost of transporting a locomotive in this manner from Boston to Buffalo, is twenty cents per mile; from Buffalo to Erie, thirty-five cents; from Erie to Cleveland, fifty cents; and from Toledo West, twenty-five cents.—The extra rate charged from Erie to Cleveland can only be accounted for on a supposition that the line lacks facilities for doing the business presented. These Mr. Kasson has supplied by purchasing a locomotive, at a cost of \$8,000, to be devoted exclusively to this business over the Cleveland and Erie road. By the above tariff of charges the cost of transporting a locomotive from Boston to Cleveland would be \$183 96, although some additional expense would occur in Troy. The lake freight has however been the great expense which this method has materially reduced.

OFFICE L. & U. M. R. R. Co.,
Lawrenceburgh, Oct. 11, 1853.

NOTICE is hereby given that at a meeting of the Board of Directors of the Lawrenceburgh and Upper Mississippi Railroad Company held on the 3d day of October, 1853, the following resolutions were adopted, viz:

Whereas, the principal places designed to be connected by the diversion and extension of the Lawrenceburgh and Upper Mississippi railroad from its earlier bearings were the cities of Indianapolis and Cincinnati, and whereas, under its present title such leading object of the road is not as distinctly indicated as is desirable for general information.

Therefore: Be it resolved by the Board of Directors of the Lawrenceburgh and Upper Mississippi Railroad company that the corporate name of the said company be, and the same is hereby changed, and the said company shall from and after the first day of December next be known by the name and style of "THE INDIANAPOLIS & CINCINNATI RAILROAD COMPANY," and as such shall hold, exercise and enjoy all the privileges and rights exercised and enjoyed, and be subject to all the engagements, contracts and restrictions incurred by said company under its former name, according to the provisions of the General Law of the State of Indiana, authorising Railroad Companies to change their names.

A true copy, WM. G. DUNN, Secretary.
3t 43

OFFICE L. & U. M. R. R. Co.,
Lawrenceburgh, Oct. 12, 1853.

NOTICE is hereby given that at a meeting of the Board of Directors of the Lawrenceburgh and Upper Mississippi Railroad Company, held on the 3rd day of October, 1853, the following resolution was adopted, viz:

"That interest on the stock of the company shall cease after the first day of January next, and that thereafter regular dividends of the net earnings of the Company shall be declared every six months."

"That the Secretary procure a handsome certificate of stock to be engraved in the new name of the company to be issued on and after the first of January next for the principal and interest then due on stock."

"That where fractional sums less than a share shall occur, the owner of the same may pay the difference, and take a share of stock, or receive a separate certificate for such fractions entitling the holder to a share when the residue is paid in cash, or by like certificates."

Pursuant to the above, stockholders are requested to surrender their certificates before the 1st of January next, when new certificates will be furnished including principal and interest due to that time.

3t 43 WM. G. DUNN, Secretary.

To Contractors.

PROPOSALS will be received at the office of the Chief Engineer of the New York Central Railroad Company, in the Exchange in the City of Albany, till the 15th day of November next, inclusive, for the graduation for the second track from Syracuse to Rochester by the direct route.

The work embraces about eighty-one miles of road, and is well worthy the attention of Contractors.

The profiles and specifications of the work will be ready for examination on and after the 7th day of November, at the office of the Chief Engineer.

GEO. E. GRAY,
Chief Engineer.

Albany, October 27th, 1853.

Small Rails.

THE SUBSCRIBERS manufacture and keep constantly for sale, *Light Rails* of the most approved patterns, weighing 22, 25, 28, 40 and 50 lbs per yard, suitable for Colliers, Mines, Quarrymen and Contractors, or for turn outs, depot and branch tracks.

CHARLES E. SMITH & Co
Falmouth Iron Works, Philadelphia.
CHAS. B. SMITH, HENRY MORRIS,
THOS. T. TASKER, ALISTAR MORRIS.

HENRY TANNER vs. the Hudson River Railroad Company.

THIS was a suit brought by the plaintiff for an alleged infringement of letters patent granted to him as assignee of the inventors, L. H. THOMPSON and A. G. BACHELDER: "for an improved Railroad Brake," by the use on the said road of brakes made on plans, alleged to have been invented by NEHEMIAH HODGE and also by H. A. STEPHENS and purchased by the said defendants, from the said Hodge & Stephens and also for use of the plan as patented to said Tanner.

The suit was noticed for trial at the October term of 1853, and put over the term by the motion of Defendant's Counsel by paying the costs of the term.

And thereafter the Defendant's Counsel made overtures for a settlement which resulted in the defendant's acknowledging the validity of plaintiff's patent, the infringement of the said patent by the use of double acting brakes on the plan of the said patents &c., and the Company paying to the said plaintiff for the right to use the said invention and for the withdrawal of said suit the sum of ONE THOUSAND DOLLARS and costs.

Having read the above I do certify to the correctness of the statements therein contained.

October 25th, 1853.

THOMAS M. NORTH,
Secret'y and Attorney of the
Hudson River R. R. Co.

New York, October 26th, 1853.

This is to certify that I was of Counsel for the plaintiff in the above entitled cause, that the suit was brought for the recovery of damages from the Hudson River Railroad Company for the use on their cars of brakes, made on the plans described in the patents granted to Charles B. Turner on the 14th, of Nov. 1848, to Nehemiah Hodge on the 2d, of October 1849, and to H. A. Stephens on the 25th, of November 1851. That in preparing for the trial of the above entitled cause I made a careful examination of all the facts, given in the notice of defence and became satisfied that Thompson and Bachelder, from whom Tanner derived title, were the original and first inventors of the Double acting Brake covered by the plaintiff's patent and that the Brakes of Turner, of Hodge, and of Stephens are infringements of the said Tanner's patent.

CHS. M. KELLER.

Brunswick Iron Works.

WEDNESBURY, ENGLAND.

TYRES, AXLES, WHEELS, and all kinds of Railway equipment of the Brunswick Iron Company's manufacture. Orders received at the office of the Agency, No. 55 William street, New York.

44tf GEO. W. BILLINGS.

Stuart, Serrell & Co.,

CIVIL ENGINEERS,

Rooms 22, 24, 26 & 27,

157 Broadway, New York.

CHARLES B. STUART,
DANIEL MARSH,

EDWARD W. SERRELL,
SAMUEL MCLEROY.

TYRES.

LOCOMOTIVE AND CAR WHEEL TYRES, from the Manufactory of the celebrated and well known Iron Works of the LOW MOOR CO., in England, are furnished by the subscriber, Agent, by direct importations, ready Welded, Blocked, and Rolled, from only ONE BAR and with only ONE WELD, at a cost much below that of any other stamp.

Importations through the last year of nearly 3000 Single-welded Tyres, which are now found running on the important Railways, have rendered them in almost exclusive use, and their performance of over 20,000 miles each, have elicited the highest recommendations of their superiority.

All work of this Company is warranted to give satisfaction. Sample Tyres may be seen at the Crystal Palace, New York, and at my Warehouse, 9 Liberty Square, Boston.

W. BAILEY LANG,
24 BROADWAY, N. Y.
9 LIBERTY SQUARE, BOSTON.

Railroad Iron.

THE undersigned being appointed Agent to Messrs. Guest & Co., the proprietors of the Dowlais Iron Works, near Cardiff, South Wales, is duly authorised to contract for the sale of G. L. Rails on the most advantageous terms.

April 22, 1852.

RICHARD MAKIN,
21 Broadway,

To Contractors.

CHIEF ENGINEER'S OFFICE, N. & P. R. R. Co.,
Norfolk, Oct. 13, 1853.

SEALED PROPOSALS will be received by the undersigned at this office from the 8d, until the 15th day of December next, at noon, for the graduation and masonry of 62 miles of the Norfolk & Petersburg railroad between the city of Norfolk and Warwick Swamp in the county of Sussex.

The line will be divided into sections of about 4 miles, and bids will be received for one or more of said sections.

Maps and profiles of the line will be ready for inspection and specifications with forms of proposals may be had of the undersigned on and after the first day of December.

Payments will be made in current money during the progress of the work in proportion of four-fifths of the amount due.

As soon as practicable after the examination of the proposals, those to whom the work will be allotted will be duly notified, and if deemed necessary required to give bond with satisfactory security for an amount not exceeding one-tenth of the amount of work to be done.

The company reserves the right to accept such proposals as in their judgment will secure the prompt and faithful execution of the work according to contract, or reject all, if none are satisfactory.

The line is easy of access, the country through which it passes is of mild climate and abundant in supplies. Postage on all communications must be prepaid.

W. MAHONE,
Chief Engineer.

Railroad Iron.

2,000 TONS FIRST CLASS WELSH RAILWAY IRON, to be made to any ordinary T. pattern required by the buyers, and for shipment from New, or, Wales, in December, January, and March next, a copy to the undersigned, for many years connected with the largest house in the trade.

JOHN H. AUSTIN & CO.,
2 Ingram Court, Fenchurch street London.

To Contractors.

PROPOSALS will be received till sunset Nov. 21st for the Graduation, Masonry, and Superstructure of the CLINTON LINE EXTENSION RAILROAD from Hudson to its intersection with the Mad River Railroad, a distance of about one hundred miles. The route occupies a perfectly healthy country, thickly inhabited, and accessible at all points.

Also, at the same time, for the construction of the portion of the Clinton Line Railroad not under contract extending to the Ohio and Pennsylvania State Line.

Specifications, Maps and Profiles will be ready for examination ten days before the letting at the Engineer's office in Hudson.

H. N. DAY, President.
W. B. BRINSMADE, Chief Eng'r.

Hudson, Ohio, Oct. 10th, 1853.

Book and Job Printing.

The undersigned have added to the PRINTING ESTABLISHMENT of the "RAILROAD JOURNAL," an extensive OFFICE for BOOK AND JOB PRINTING, which they are now prepared to execute in the BEST MANNER, and with DISPATCH. They respectfully solicit from RAILROAD COMPANIES, orders for the PRINTING of Exhibits Time-tables, Circulars, Tickets, &c., &c.

J. H. SCHULTZ & CO.

New York April 9, 1853.

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Long West

Red Deer R.
Bow River

South Branch of Saskatchewan R.
Isothermal line of 40°F.

Asiniboia R.
Prairie-Plain
White earth R.
Prairie
Pop. 80,000

MINNESOTA

Pop. 6,077

MISSOURI
TERRITORY

IOWA

Pop. 192,214

WISCONSIN
Pop. 305,191

ILLINOIS

Pop. 851,400

MISSOURI
Pop. 682,043

INDIAN

TERRITORY

ARKANSAS
Pop. 292,089

TEXAS

Pop. 212,592

LOUISIANA
Pop. 511,974

MISSISSIPPI
Pop. 606,550

International boundary

between

San Francisco and St. Louis 1752 miles

St. Louis 1582 miles

Direct line between San Diego and New Orleans





Map

OF THE

NORTHERN ROUTE